Dynamic Explanations of Industry Structure and Performance

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I.   Introduction

Since its genesis in the 1930s industrial organization economics has grown as a corpus of scientific knowledge by two interrelated avenues: deductive theory and inductive empirical study of markets. Most work has focused on the definition of an industry or market, the organization of such markets including the condition of entry, the strategic conduct of incumbent and potential entrant firms, and the performance of firms and the overall market. Work in this area has evolved from rich comprehensive industry case studies called for by Mason (1939), such as Nicholls (1941), Hoffman (1940), and NCFM (1966), to narrowly focused, complex econometric studies. Ideally these econometric studies are based upon, new, very large, disaggregate data sets with great detail on transactions, advances in econometrics, and extensive computing power. Today we estimate and test directly market and firm models first offered in the 1930's, and subsequently refined by theorists.

Perhaps the overriding issue in horizontal industry analysis has been the determinants and degree of market power. Included in this conundrum are alternative explanations of firm strategic advantage (increased profits and or market position) such as real economies of scale and scope, and product quality. Considerably less, but by no means trivial, work in industrial organization has examined the vertical organization of the economy and the internal organization of firms.

Traditionally vertical organization work is classified into two areas: vertical integration (Perry, 1989) and vertical contracting or coordination (Katz, 1989). Most work on vertical integration has been an extension of horizontal market analysis to determine whether market power can be transferred via integration to neighboring stages in a market channel, or whether integration raises entry barriers and creates power in one or both industries. Work on vertical coordination has effectively eschewed neoclassical analysis, opting for either a Coase-Williamson transaction cost approach or an agency theory of the firm (Hart 1995, Grossman and Hart, 1988) framework. Vertical coordination analysis has typically analyzed exchange between two successive stages in a market channel, e.g. growers and processors or manufacturers and retailers, to determine when and why contract coordination between a particular seller and buyer replaces arms length transactions in market. As we will demonstrate in this paper incentives for such coordination increase with increasing concentration in the food sector.

Work on the neoclassical "block box", i.e. the firm, has also eschewed neoclassical analysis and used Coase-Williamson transaction costs or agency theory to make significant progress in our understanding of the demarcation between firm and market as well as the internal organization of firms. Writing on the relationship between three different approaches to analyzing the nexus between firms and markets Demsetz states:

> "Neoclassical theory is focused on specialization, not on managed coordination. Coase's theory is focused on managed coordination, not on specialization. Contemporary theory has a still different emphasis. Its concern is mainly with agency problems, but, it is

more closely related to Coase's theory than to neoclassical theory because its focus is on optimal mixtures of market-based incentives and management-based controls. [Demsetz, 1997, p. 427]

He continues:

"The firm in neoclassical theory reflects the imperatives of the price system, not those of management; if the price system works well, resources are allocated well. Imperfect information, in contrast, makes the judgement of managers and owners a source of productivity enhancement. The main source of management's productivity in contemporary theory has been in its response to agency problems." [Demsetz, 1999, p. 428]

In addition to the analysis of shirking, opportunism, and reputation effects within a firm's labor force and with it trading partners in markets, agency theory has also been used to analyze the relations between top management, the board of directors, and stockholders. Building on the classic work by Berle and Means (1932), Henry Manne (1965), Fama and Jensen (1983), Jensen (1986) and others have constructed a theory of corporate control.[1] Therein a merger or leveraged buyout are actions in a market for corporate control that redress the failure of shareholder elected boards to discipline top management for poor performance. Good management drives out bad management or so the claim goes. We will critique and expand this theory to explain how financial capitalists created market power to benefit investors. Examples

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[1] The separation of ownership and control dates to the advent of the modern, limited liability corporation in England:

"In 1837, when the first Limited Liability Act was passed, the organization of joint-stock companies was regulated and the personal liability of each shareholder was limited to the amount of his share. Previously, if the company went bankrupt, the entire property of each individual shareholder could be used to pay the company's creditors. The new Act caused a flood of wealth

of financial as opposed to industrial capitalists include J.P. Morgan at the beginning and Harry Kravis at the end of the 20th century.

Demsetz, however, would have us look beyond the contributions of agency theory and allocate some effort to neoclassical theory, especially when analyzing vertical organization issues. He argues that:

> "The focus in this effort has led to the neglect of information problems that do not involve agency relationships … Should agency problems be the primary guide to understanding vertical integration? Perhaps, but consider, for example, the role of "expertise." … The manufacturer of commercial aircraft possesses specialized knowledge that can be extended at little cost into the business of maintaining older aircraft. Vertical integration of these two businesses is, therefore, a practical possibility. Vertical integration of aircraft manufacturing and airline transportation, on the other hand, is more difficult. Effective vending of airline transportation to the general public requires operational and marketing know-how not normally part of the knowledge needed to manufacture aircraft. The difficulty this poses does not depend on agency problems. …The focus on agency relationships has also led to neglect of some useful neoclassical theorizing. The successive-monopoly problem, price discrimination, and price controls, as examples, offer motives for vertical integration not involving agency problems." (Desmetz, 1999, p. 428)

In this paper we honor Demsetz's call for a refocus upon neoclassical theory to explain some critical issues in the vertical organization and performance of the economy. This approach yields new insights and advances new models to analyze the impact of market power. Specifically we go beyond the analysis of market power within an industry such as food retailing or a food processing industry to consider the implications of market power in successive industries in a market channel. Implications include the need for vertical

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to pour into limited liability companies, which provided much of the capital for new industries, and London became the financial capital of the world." (Charlot, p. 337)

coordination rather than arms length pricing in a wholesale market to improve market performance; hence an explanation for the decline of wholesale markets and the rise of Efficient Consumer Response (ECR) and category management. Successive monopoly or oligopoly also has a heretofore unrecognized impact on farm to retail price transmission, and in most cases reduces vertical pricing efficiency. With the exception of McCorriston et al. (1998), Cotterill (1998, 2000) and Dhar and Cotterill (2000), no one has specified formal economic models to analyze the impact of noncompetitive market channel structures, i.e. market power at one or more stages of the system, on price transmission.

Finally this paper is also more general in the tradition of Mason and Hoffman. The next section will review, for want of a better term, Krondriatiff cycles (Schumpeter 1935), in the organization of the food sector during the 20th century.[2] The sector has experienced growth and transformation in response to "waves" in the advance of basic human knowledge, as well as secondary waves in culture, social organization, and public policy. One of the organizing themes of this conference is that the consumer has and will continue to shape the

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[2] Schumpeter explains long waves of economic progress as follows:

"Historical Knowledge of what actually happened at any time in the industrial organism, and of the way in which it happened, reveals first the existence of what is often referred to as the "Long Wave". … It has been worked out in more detail by Kondratieff, and may therefore be called the Kondratieff Cycle. Economic historians of the nineteenth century have unconsciously and independently testified to the reality of the first of these waves our material allows us to observe, viz., the cycle from about 1783 to 1842, the "industrial revolution," …The years 1842-1897 are readily interpreted as the age of steam and steel, particularly as the age of the railroadization of the world. This may sound superficial, but it can be shown in detail that railroad construction and work incident to it, connected with it, or consequential upon it, is the dominant feature both of economic change and of economic fluctuations during that time. … Future historians finally will find no difficulty in recognizing the initiating importance of electricity, chemistry and motor cars for … the third Long Wave, which rose about 1897.
(Schumpeter, 1935). Today we are clearly at the beginning of the "internet wave" an event probably equal in importance to the railroad wave and automobile/electricity wave.

organization of the food system. Well, yes and no. As we will see this is true to the extent that one equates the evolution of the consumer with economic growth and cultural shifts observed during the 20th century. There are however many other equally important, and in certain situations more critical, determinants of the organization and performance of the food sector. Demand, one half of the Marshallian scissors, must be augmented by supply side phenomena, including the status of competition, technology, and public policy to have a complete picture.

The third section of this paper reviews the relatively sparse neoclassical work on the vertical organization of market channels. We develop a more general framework. The remaining sections of the paper analyze current and near term future issues of organization and performance. These include the analysis of farm to retail price transmission in noncompetitive market channels, the rationale and impact of leveraged buyouts, the impact of successive monopoly/oligopoly on vertical strategy, the rise of retail buying power including slotting fees, and the impact of globalization on the vertical and horizontal organization and performance of the food sector.[3]

II. 20th Century Redux

The food sector in the developed economies of the U.S. and Europe has indeed been extremely dynamic. In 1900, for the majority of North American and Western European "consumers", food was either grown or purchased in raw form and it was cooked over a wood burning stove in a house with no

indoor plumbing, no mechanical refrigeration or freezing, and no electricity. Centuries old procedures for food preservation were commonly used: drying, salt, smoke, or storing in root cellars. Up to 50 percent of a household's disposable income and probably an equal proportion of a household's labor were needed simply to eat. Moreover the common diet was atrocious with an excess of salt and fat, and a lack of fresh fruits and vegetables. Clearly 20th century progress in the food sector has offered more for human welfare than progress in the sector over the prior 2000 years.

This progress has come part and parcel with the development of an industrial, science based food system and the growth of advanced wealthy industrial economies wherein consumption has clearly been divorced from production in all industries due to economic specialization.

The mere fact that we are dramatically more well off today than in 1900, however, does not preclude careful analysis of the organization of the food sector to improve its performance. The fields of agricultural marketing, industrial organization analysis, and general economic analysis have similarly grown exponentially with the rise of the modern 20th century economy. This coincidence is more than fortuitous. To paraphrase Thorstein Veblen, economists are engineers who tinker and tune the price system and its corresponding set of markets to change and improve performance. Improved performance is identified not only by gains in economic efficiency but also by public goals set by governments.

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[3] A complete view of the economic evolution of the food sector would include changes in farming including

Turning to Table 1 one can identify four major eras in the evolution of the food sector since 1900. In the first era firms and other market intermediates were small or at best medium sized with the exceptions of a few "trusts" in areas such as sugar and beef. The advent of the transcontinental railroads and commercial refrigeration prior to 1900 had allowed the red meat, dairy and other food industries to develop on a national or regional basis (Chandler, 1977, Part II). For the first time vertical market channels of some import appeared e.g. dairy farmer, milk assembler, rail transport, milk bottling and distribution door to door. Most food processing however remained rudimentary and local/regional in nature. Most markets, were effectively competitive and entrepreneurial. The supply chain in urban areas was run by regional or city wide wholesalers. Commodities dominated. In 1900 40 percent of Americans still lived on farms (Kristoff).

From 1920 to 1945 the first wave of science, industrial organization, and consumer convenience hit. Food processing by large publicly owned corporations established national and regional brands. The large-scale production of these packaged goods required and was made possible by the development of advertising in print and on radio. The advent of the automobile, truck and a road system transformed the logistics of food distribution. In 1920 chain stores accounted for only 2-3% of all grocery sales. By 1930 the top 5 chains accounted for 25% [Bain, 1958, p. 484]. Only A&P was close to national with operations in 37 states in 1948. Safeway was next

agricultural policy and cooperative marketing as a movement to sustain parity in economic welfare for farm families

with operations in 23 states (NCFM, 1966b, p. 347).   Since in most local markets only one or two chains were present with multiple outlets, local market concentration in the 1930s and 1940s was very low, below 40% in most major cities.

These retail chains were innovators. To a large extent they passed on to consumers the cost savings gained by integrating and creating large, for that era, wholesale operations. Product variety increased with the advent of brands, and chains introduced private label (their own version of the brand) during the 1920-1945 era.   Sutton (1991) argues convincingly that the advent of commercial advertising and national brands in this era initiated the trend towards concentration in food manufacturing. This was more often than not via merger and acquisition (Hoffman 1940).

Supply chain control shifted from merchant wholesalers to the national food manufacturers with the tacit cooperation and support of integrated retail chains and surviving wholesalers. The latter moved towards voluntary or cooperative status to capture many of the vertical and horizontal scale economies for independent, non chain store, retailers. These organizations also led the independent grocery store operators quest for government intervention via the passage of the Robinson-Patman Act (1936) and other laws in an attempt to ensure "a level playing field" for independents. Picture 1 of the A&P grocery store in Main Street, Mystic, CT in 1940 captures the "consumers venue" during this era. Some may find it surprising that nearly all of the

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and rural communities. This issue begs for attention (Kristoff), however, this paper is all ready at its limit in size.

economic issues related to the organization and performance of the food sector that we face today, surfaced when this was the typical chain store. Technology has advanced but the issues of efficiency and power remain unchanged.

Underpinning the advances in chain store and large scale wholesaling was the rise in per capita income during the 1920's and the migration of Americans from farms and urban barrios to the suburbs of Jay Gatsby (F. Scott Fitzgerald), that Walt Disney, and Hollywood movies soon entertained. Refrigerators, gas or electric stoves, and electric appliances now made cakes mixes and others partially prepared or processed foods easy to store and finish in the home kitchen. Home economics grew in tandem with the industrial food system.

The third phase in the century, one of internationalization of the food industries spans 1945 to 1980. Many leading food companies expanded multinationally. Communication and exchange of best practices increased. Migration to the suburbs rapidly accelerated and supermarkets bloomed. The suburban supermarket with a parking lot, self-service, and a much broader product selection rapidly replaced the store front on main street in cities. The automobile became an essential cog in the distribution channel.

With the rise of commercial network television in the U.S. this era can truly be described as the golden age of manufacturer brands and mass marketing of food products. Wholesaling and wholesale markets commenced a long term decline in importance. Farmer cooperatives, many initially organized in the 1920s or earlier, and other forms of vertical coordination, e.g. the broiler

industry, rose to dominate producer processor relations in many commodity industries. In many instances the vertical coordination was complete to final consumption via the creation of brands. Consider, for example, Sun Maid Raisins, SunKist Oranges, Ocean Spray Cranberries, Welches Grape Juice, Land 'O Lakes Butter by farmer cooperatives; and, Purdue Chicken, and Tyson Chicken by investor owned firms.

Mergers and acquisitions in food manufacturing and among retail chains during the 1945-1980 era contributed to the rise of tight oligopolies in many processing industries and local retail markets (Connor 1985; Marion et al. 1979, NCFM, 1966b). Branded food manufacturers dominated the supply channels during the 1945-1980 era, however new supermarket chains with substantial turnover (over $500 million in the 1960's) challenged for leadership. Their primary move was to expand private label offerings by integrating back into food processing (NCFM, 1966b, ch. 4). Leading supermarket chains in the 1960s were far more integrated than they are today.

The peak and demise of this bricks and mortar strategy was the A&P WEO (Where Economy Originates) campaign in the early 1970s (Marion et al. 1979, p. 74). A&P had been the leading food retail chain since pre-supermarket days in the 1930's. It's national share, however, steadily eroded after the second world war for a variety of reasons, one of which was its overconfidence in its private label products in face of the advance of advertised manufacturer's brands during the era. In a final last hurrah for backward integration A&P built a huge 40 acre plant in Horseheads, NY for the

production of private label products, expanded other plants and committed to building relatively small, expensive brick supermarkets that were primarily stocked with low cost (and perceived quality) A&P private label products. When the strategy clearly was failing they instituted a nationwide price war (WEO) in 1972 and 1973. It was one last attempt to convince consumers that their products and services were right, and to gain much needed market share to sustain their production systems. They failed because other supermarket chains correctly perceived that consumers wanted stores nearly twice as large, superstores with more than 30,000 square feet, stocked with advertised brands, nonfood items (health, and hygiene, kitchen items, and floral) and service departments, most notably a deli and in-store bakery. Ergo the end of vertical integration as a strategy by retailers, and the advent of broad assortment retailing by supermarkets and mass merchandisers.

During the 1945-1980 period public policy, most notably merger enforcement, became very active in food industries. In the 1940's government leaders and economists generally, and especially industrial organization economists, harbored deep concern that the great depression was at least in part caused by the trend towards large corporations and tight oligopoly. There was a fear that tight oligopoly was replacing and/or subverting the price system of competitive markets (TNEC 1941, Roosevelt 1941, Berle and Means, 1932). Gardiner Mean's administered price hypothesis, counseled that large oligopolists lay off workers rather than cut price when faced with declining

demand (Means 1935)[4].   Stocking and Watkin's (1946) had carefully documented many global price fixing cartels during the interwar period. Their impact on trade and aggregate demand was an issue. Finally there was the concern that economic concentration and power would coalesce with political power as it had done in Japan, Germany, and Italy to subvert democracy. On the positive side for economic concentration was the lonely plea by Schumpeter (1949) that economic concentration was necessary for business to be able to afford to do research and development that would contribute to long term economic Krondiatriff cycles and growth, thereby avoiding another depression.

As the 1945-1980 era unrolled, economic research and the balm of economic growth refined and generally rejected all of these theories as causes of depressions. Research turned to a more focused analysis on how mergers and other strategic moves by firms in oligopolies affect pricing efficiency and consumer welfare.

The final 20 years of the century was an era of globalization. The cold war ended and capitalism as a social as well as an economic system advanced. The most important transformation was the rise of a global capital market that is a more direct and powerful mechanism for controlling the fortunes of publicly owned corporations, including food firms. In this era the hostile takeover, the leveraged buyout or the defensive leveraged recapitalization (e.g. Kroger 1988) re-engineered American corporations, especially food retailers and manufacturers, in the U.S. A similar process is now underway in Europe with

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[4] For an excellent review of Means hypothesis and the literature that has subsequently addressed it see Greer 1992.

the liberalization and merging of capital markets into the global market. Important components include the Euro, the revitalization and expansion of European stock markets as a vehicle for allocating equity capital and for deploying consumer savings, and finally the advent of American style investment banking to power this "American" capitalist system forward (Andrews).

During the 1980-2000 era market concentration in food manufacturing and retailing accelerated to high levels (Rogers, 2000). Curiously vertical integration between the two stages declined dramatically, especially for food retailers. This polarization or specialization, however, was accompanied by a rise in retailer controlled brands produced under contract in a tightly coordinated fashion by manufacturers. In Europe control of the supply chain is clearly lodged at the retail level (Bell 2000). Given the lack of commercial TV advertising, and consequently weak, more fragmented brands in each county, retail brands and channel control has always tended to be stronger in Europe.

In the U.S. supermarket retailers during this period rapidly moved towards superstores and even larger combination food-drug emporiums, and super centers - full scale supermarkets combined with a discount mass merchandise operation that sells everything from lawn and garden to car repair, to home fixtures and clothing. The top six supermarket retailers (Kroger, Safeway, Albertsons, Royal Ahold, WalMart and Del Haize) now control over 50% of supermarket sales, up from 32% as recent as 1992 (Cotterill 2000).

This increase in buyer concentration and increased focus on retail labels has clearly shifted control of supply channels towards retailers.

At the end of the century a new distribution channel, firms that specialize in Internet based home delivery of groceries has surfaced. Although many see this as the harbinger of new competition, we question whether they will survive another 12 months.[5] The stock market was the major source of equity capital, via IPOs, for these new firms. The stock market performance of Peapod, Webvan, Streamline, and Home Grocers has been disastrous (Appendix A). Investors in these IPOs have lost more than 80% of their capital to date and the trend clearly suggests a complete loss. Peapod, the largest and oldest Internet grocers lost $28.5 million in 1999 on sales of $73.1 million (Food Institute, 3/20/2000, p. 4). At its initial public offering in June 1997 its stock traded at $11.25 per share. On April 12, 2000 its stock traded at $2.81 per share. On April 14 Royal Ahold purchased 51% of Peapod. Ahold also recently purchased the second largest food service firm in the U.S. Perhaps they see synergies, but we remain most skeptical of internet and warehouse based home delivery business models.

Until one can establish a dense distribution network in a local market area, the genius of the supermarket model, getting consumers to do the final picking and distribution of products, will dominate for all but the most wealthy consumers. Moreover those probably will be most efficiently supplied by Peapod's old model, internet ordering but delivery from a local supermarket.

Ahold, in the affluent Northeast corridor, is well situated for adding this value added service to its supermarkets. The warehouse based distribution model that Peapod is converting to may be history.

During the last 20 years of the century food expenditures is a share of disposable income have continued their secular decline to less than 10% in the U.S. Eating out has increased so that consumer expenditures for away from home food now rival purchases from grocery stores for home meals.

As we move into the 21st century globalization is accelerating. American food manufacturers and European supermarket retailers are taking the lead (Ramsey 2000). In its 1986 LBO Safeway sold its substantial UK and Australian operations, keeping only its strong dominant position in Western Canada. No other U.S. food retailers, except very recently WalMart, with its move into Germany and UK Supermarkets (ASDA) has foreign operations of any size.

III. Expanding the Neoclassical Theory of Vertical Organization and Performance

"It is nothing new or startling nowadays for us not to supply our own needs for soap. Nor does it seems strange that many of us could not even describe the process of making soap. We do not feel ashamed of not understanding the intricacies involved in manufacturing steel or assembling an automobile. On the contrary, we take distinct pride in the fact that we do not need to know how to make soap, steel, or automobiles. We are glad to be able to depend on others to do such things for us and to rest content in the knowledge that they are doing a much better job than we could. Ours is not an era like that of 150 years ago, when self-sufficiency was the order of the day. One of the distinct marks of the economic progress of our age is rooted in the fact that

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[5] Internet ordering of groceries from local large supermarkets, and the Priceline.com offering of low priced groceries, a very clever adaptation of consumer promotion and trade programs, may be successful.

inventive genius has given us a civilization of specialists." (Adams and Gray, 1950 p. 3)

This quote from Walter Adams and Horace Gray points to our path. As the parent of teenagers, now I know why it is clearly not cool to be self sufficient or to learn about dull topics. The next generation is simply following the specialization dictum of economics. We start with Adam Smith and Benjamin Franklin, proceed to George Stigler and then expand Stigler's model. The fundamental questions are what determines the organization of a food marketing channel into firms and markets, and how does a particular organization effect the channel's performance.

Adam Smith keenly observed that specialization was the key to economic progress and that it was limited by the size of the market.

"As it is the power of exchanging that gives occasion to the division of labour, so the extent of this division must always be limited by the extent of that power, or, in other words, by the extent of the market. When the market is very small, no person can have any encouragement to dedicate himself entirely to one employment, for want of the power to exchange all that surplus part of the produce of his own labour, which is over and above his own consumption, for such parts of the produce of other men's labour as he has occasion for. … In the lone houses and very small villages which are scattered about in so desert a country as the Highlands of Scotland, every farmer must be butcher, baker and brewer for his own family." (Smith, 1776, Book 1, Ch. 3)

For food industries to form, i.e. the butcher, the baker, and the brewer, they had to be spun off from the farm and town homes. The market for such specialized activity had to be enlarged via the growth of cities (urbanization), the improvement of transportation, and the reciprocal development of trade for agricultural and other products so that exchange among all persons could

occur.   This latter point is often unappreciated, but critical for ultimate performance.   Only those who work in the exchange economy benefit and they do so relative to their productivity and power position.   This issue of parity for agriculture in this industrial system has been and remains a perennial concern.

Smith commented at length on the great importance of cheap water versus expensive or nonexistent land transportation in his day.   (What goods could bear the expense of land carriage between London and Edinburgh, between London and Calcutta?)   Since his time we have had several transportation and communication advances that have expanded our ability to specialize, e.g. railroads, automobiles, airplanes, telephone, radio, television and the internet (Chandler).   These and other new technologies have also created entirely new industries and have transformed the production technology of old industries in addition to simply making the market larger so specialization could occur within the old technology.

Commenting on Smith's specialization due to truck, barter, and exchange, Benjamin Franklin, a citizen of a non industrial, agrarian and frontier economy, quickly appreciated what Alfred Marshall called external economies and what we now routinely call infrastructure.

> "Manufactures, where they are in perfection, are carried on by a multiplicity of hands, …If by royal munificence, and an expense that the profits of the trade alone would not bear, a complete set of good and skillful hands are collected and carried over [to the U.S.], they find so much of the system imperfect, so many things wanting to carry on the trade to advantage, so many difficulties to overcome, and the knot of hands so easily broken by death, dissatisfaction, and desertion, that they and their employers are

discouraged altogether, and the project vanishes into smoke."
(Franklin as quoted in V.S. Clark, 1949, p. 152)

The division of labor is not a quaint practice of eighteenth-century pin factories; it is a fundamental principle of economic organization. In the present instance, the organization of food industries depends upon our human capital infrastructure as well as the physical infrastructure of the economy. These change over time.

George Stigler (1951) is the only economist to squarely address the issue of vertical market channel organization within the confines of neoclassical theory of the firm and market equilibrium. Perry (1989) acknowledges that Stigler's effort was limited to his short 1951 article and 3 or 4 subsequent pieces have attempted to test or expand Stigler's theory.

Stigler introduces his theory by explaining that the firm is portioned among production processes rather than the usual input market configuration i.e. the textbook example of production isoquants in capital and labor space. In his basic model he ignores the possibility that costs for one process are related to costs of the other distinct processes. This means that one can derive a cost function for each process that is only a function of output. Finally he assumes fixed proportion (but not constant returns to scale) production so that one can draw all cost functions on one graph with final output as the quantity index on the X axis.

Figure 1, reproduced from Stigler (1951) illustrates the theory for a firm with 3 distinct production processes. Note that the U-shaped average cost for the firm is the sum of the 3 process cost functions. Process Y_1 has increasing

returns.   Process Y_2 has decreasing returns, and process Y_3 has both to produce U-shaped curve. A critical question is when will Y_1 splinter from this firm, and presumably other firms in this industry, to become a separate industry?

Stigler answers that at a given time this process may be too small to support a specialized firm or firms. He states:

> "The sales of the product may be too small to support a specialized merchant; the output of a by-product may be too small to support a specialized fabricator; the demand for market information may be too small to support a trade journal. The firm must the perform these functions for itself." (Stigler 1951 p. 188)

This proves Adam Smith's theorem that the division of labor is limited by the size of the market.

As the economy, and in particular this industry grows, the magnitude of the function subject to increasing returns may become large enough to permit a firm to specialize in producing it. This new firm may initially be a monopoly but its limit price would be determined by the old industry's ability to revert to in-house production. With growth over time output expand until process Y_1 also experiences decreasing returns and then one might see entry into this new industry and a trend towards a competitive structure. This is the reasoning for Stigler's implicit competitive economy.[6] Imperfect competition exists, subject to a limit price, only until economic growth deconcentrates the new industry.

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[6] Figure 1 is an exact reproduction of Stigler's figure. Note that price, not dollars or costs, is on the Y axis. Stigler clearly maintains that these cost curves determine price, but he does not explicitly include a demand curve, nor does this say how these cost curves determine industry supply. No equilibrium price is identified in the figure. Stigler's theory is incomplete unless one provides his implicit competitive markets assumption and then identifies price as the LR equilibrium price that occurs at the minimum point of the average cost curve.

Lest one think we not need an expanded theory, when have we observed such industrial deconcentration with growth?

Note in Figure 1 that if the spin off produces Y_1 at a cost equal to the horizontal dotted line then the firm that does processes Y_3 and Y_2 enjoys the new lower average cost curve given by the dotted shift in AC. The spin off not only reduces costs, it reduces optimal scale. Again a curious prediction, counter to what we have experienced in this century. Economic growth has not led to lower optimum scale in industry as spin offs have created new and large, relative to the market, optimum scale industries. Consider for example the optimum sized farm over the 20th century.

Stigler also notes that outsourcing of production could also occur for Y_2, the process with decreasing returns. In this case economic growth and spin off increases optimal scale. An example of this effect is food manufacturing companies that have dismantled brand marketing units and outsourced individual components such as focus group research, and econometric analysis of demand to smaller boutique firms. Outsourcing of advertising programs may go this way but more often it seems to be subject to increasing returns because it is usually awarded to large-scale advertising agencies rather than boutiques.

But for the fleeting possibility of monopoly, Stiglers theory focuses only on costs and implicitly assumes that the least cost combination determines the market channel structure. Baligh and Richartz (1967) and other logistics oriented analysts have expanded this functional cost based analysis, but none

generalize the model to consider imperfect competition and market power as a determinant, or a result of vertical channel structure.

Stigler's theory can be expanded to provide a richer understanding issues that affect the organization and performance of the global food sector. His theory is driven by output related scale effects and the size of the market. Clearly other factors, in total, are more important. Table 2 lists all factors that influence the vertical and horizontal organization of industry. It also briefly identifies their impact. The first set contains the classic factors that Smith cited as determinants of the extent of the market. Economic growth, the growth of cities, transportation, and communication all increase incomes via increased economic specialization and exchange. The larger markets that result from advances in there areas make it economic to spin off functions into new industries. Also one can develop entirely new market channels, a possibility neglected by Stigler. Examples of the latter include convenience food stores versus supermarkets versus mass merchandisers versus internet home delivery.

Technical progress, a factor neglected by Stigler and also Perry (1989) in his review of vertical integration, has to be ranked as the single most important determinant of economic organization.[7] Food industry organization has changed due to advances in agricultural and food processing equipment, biological sciences, chemistry, pharmaceuticals, computers, optical scanners,

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[7] Perry states: "Technological economies may be an important determinant of vertical integration in some industries. However, they will not be a central topic of this chapter. In the theoretical discussions, we will generally presume that firms have integrated so as to internalize technological economies. This allows us to focus upon the more interesting economic reasons for vertical integration." (Perry 1989, p. 185)

and yes, the social sciences including marketing. Technological advances have lowered the cost of production, created new products, improved the quality of older products, created new industries and new market channels. Examples for the last two include the rise of the data utilities, A.C. Neilsen and Information Resources Inc., the artificial insemination industry for dairy cattle, the frozen food industry, and the chilled food industry.

Changes in culture and social structure via their effect on the work force and consumer demand also have a major impact on economic organization. The changing roles of men, women and children, minorities and senior citizens, are important, as is the value of leisure time. These shifts create demand for new products, diverse marketing channels that offer different mixes of convenience, value, and quality. As the labor force has changed the optimal deployment of labor has also affected vertical and horizontal organization of the food sector. Consider, for example, that the continued growth of the fast food restaurant channel may depend on seniors as well as young workers. Consider also the role of immigrant farm labor in the development of the corporate farm fruit and vegetable industries, the current role of immigrant labor at relatively low wages in the meat packing industry after the unions were broken[8], and working moms preference for ready prepared foods, take out, or the food court at the mall.

IV. The Triumph of Capital Markets: Mergers, Leveraged Buyouts and their Impact on Performance

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[8] See Cohen, *New York Times* and Bartlett and Steele, *Time* for stories on the reorganization of the meat packing industry, the role of immigrant labor, and the related demise of family farm agriculture.

An unrecognized determinant of food industry organization is the recent development since 1980 of a deep and unfettered global capital market. The stock market performance for leading U.S. and European food manufacturers, retailers, and startup Internet grocery firms are graphed in charts in the Appendix. Even a cursory examination of these gives great insight into the relative performance of these three groups and the impact of financial moves on particular firms. Compare, for example, the chart for RJR Nabisco, the victim of the most famous leveraged buyout (LBO) of the century, to the charts of other firms. Nabisco is now for sale as a downsized, stagnant business.

Stock prices rise for many reasons. Fundamental factors are a drop in investors required rate of return and growth in the earnings stream. Growth in earnings can arise from growth of the company or an increase in market power. For market power to fuel a steady rise in stock price it must also be increasing over time. A one shot increase in market power would only cause a single increase. Firms that possess market power thus may have constant or even decreasing stock prices if prospects have been squandered (See Nabisco and Kelloggs).

The invention of junk bonds by Michael Milken, Drexel Burham and Lambert, and soon copied by other investment bankers, enabled takeover artists such as Henry Kravis, Carl Ichahn, and the Haft family to finance leveraged buyouts of large publicly held corporations in the 1980s. These financial as opposed to industrial capitalists (Veblen 1919) became very, very rich from the restructuring of industries. In the 1980s mergers, LBOs, or

defensive leveraged recapitalizations affected 81% of the sales of the top 20 supermarket chain (Cotterill 1993, p. 164). Safeway's 1986 LBO by Kohlberg Kravis and Roberts (KKR) and Kroger's 1988 defensive recapitalization are two that were very successful for investors. (See the stock performance charts for them in the Appendix).

Michael Jensen, the intellectual god father of LBOs, explained that corporate management should not have discretionary control over their firm's free cash flow because they tend to reinvest it in the business at rates below stockholders' required rate of return, i.e. their next best alternative in the stock market. Leveraging the firm requires managers to pay free cash flow out to junk bond holders who can their deploy their earnings elsewhere. Stockholders in the leveraged firm can reduce their risk by purchasing junk and investment grade debt securities in the firm to construct whatever particular "strip security" and risk return ratio they desire (Jensen, 1986). More important, however is the fact that, with this financial innovation, stockholders are now assured that management is pushing relentlessly for cash flow and its most important subcomponent, profits.

What is wrong with this significant tightening of capital market supervision via corporate raiders, mergers, and internal leveraging via debt to buy back stock? Well, maybe not much on balance if the exercise of market power is left out of the analysis. Then it clearly constitutes a drive for technical and organizational efficiency and these financial engineering moves will succeed or fail based on their contribution to organization efficiency and

technical efficiency.   Agency theory works. The success of restructuring, however, in most instances depended on the breaking of unions or wage give backs, discounts, slotting fees and other give backs by other suppliers, and higher prices paid by consumers. In short the exercise of market power was crucial for their success.

The debate on the merits of LBO's, however, focused on a larger issue in political economy.   Recall that in the late 1980's and early 1990's many observers, including James Fallows, who at the time was an editor of Atlantic and wrote a book on the Japanese economic miracle, predicted the demise of Anglo-American market capitalism and the triumph of managed economies. At one point Michael Porter, in the employ of the top blue chip American companies, completed a white paper study that condemned LBO's and hostile takeovers as shortsighted demands for immediate earnings at the expense of long term profits that came from long term investments (Porter 1992). Porter extolled the virtues of managed capitalism in Germany and feared that stock market "inefficiencies" often depressed company prices below their long run value. Investors seemed only interested in the next few quarters earnings, without considering long term gains.   Such "dumped companies" were according to Porter, doing the right thing by looking long term at the expense of short run profits. If you detect a resurfacing of Schumpeters 1949 defense of large corporations for progress in R&D you are correct. In a managed capitalism, e.g. where a family, or a foundation as in the Kellogg case, or a bank as in Germany or Japan, has sufficient control to keep the wolves at bay,

Porter argued forcefully that the firm will perform better long term. Note that this improvement in performance can come from the exercise of market power, as done in Japan's Keiretsu, as well as from superior dynamic efficiency (Strom).

In retrospect, the re-engineering of American corporations was accelerated by LBO and hostile takeovers. The drive to maximize shareholder value in the short run has clearly triumphed over the Japanese, European, and Kellogg model of corporate control. Michael Jensen seems closer to "the truth", or at least superior stock market performance long term as well as short term, than Michael Porter. Economic growth also has been superior with steady expansion in the U.S., recession in Japan and stagflation in Europe through most of the 1990s. Thus we now see Germany and other developed economies moving to the Anglo-American model of deep and unfettered capital markets (Andrews, Daley, Strom).

Our point, however, is that Jensen's model ignored the key role market power played in the process. This transformation has had an impact on income distribution and consumer welfare. Europeans, rightly so, are uneasy that their social democratic societies will be dismantled in pursuit of American efficiency and power by large global or at least pan European Corporations (Andrews, Daley). Just as in the late 1800's when investment bankers such as J.P. Morgan "rationalized" industries by building trusts to make production more profitable via the avoidance of competition and the exercising of power against input suppliers, investment bankers in the late 1900's also put power

as well as efficiency into the reorganization effort. For example, when Safeway went LBO with KKR, its new highly leveraged position succeeded because management's threat to sell unionized divisions if they did not consent to wage cuts was now credible. The high price KKR paid for Safeway could only be covered if the firm could get wage give backs. The first division, Little Rock, resisted and was promptly sold to nonunion operators.[9] Workers in other divisions then gave in. Management's options were constrained by the financial structure and hence credible. Either labor and other input suppliers accepted cuts or Safeway went bankrupt.

A similar interaction between capital market structure and market power in product markets also occurred with output price (Bolton and Scharfstein, 1990). Chevalier, in fact documents that LBO supermarket retailers raised prices to increase short term cash flow (Chevalier 1995a, 1995b).

In nearly all LBO's a critical short term consequence is that there is absolutely no or very little internal cash flow available for investment in the business. (Recall Michael Jensen's insistence that it be paid out.) Moreover these highly leveraged firms cannot easily raise capital by issuing more debt or selling more stock. The short term game contradicts Jensen's model. Firms must de-leverage as quickly as possible by merger and/or divestiture so they can get back to investing in their business. Otherwise they lose market share to unleveraged competitors that can invest and expand.

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[9] The Safeway spin-off Harvest Stores ultimately went bankrupt and it share dropped from 23% in 1993 to zero. Kroger aggressively expanded and in 1999 had a dominant position with 51% of the market (Franklin, 2000). The financial capitalists certainly would approve of this divide and conquer approach to food marketing.

Safeway's 1986 LBO confirms this. Safeway market share in Washington D.C., for example dropped from 24.6% in 1985 to 23.1% in 1991. Meanwhile Giant's share exploded from 33.2% in 1985 to 43.4% in 1991 (Cotterill 1993, p. 178).

Leveraged firms typically saw horizontal mergers as a quick route to pricing power. Safeway acquired Vons in 1988. Stop and Shop, a KKR LBO was acquired by Royal Ahold, owner of Edwards, the number two chain in New England behind Stop and Shop in 1996. Pathmark, a firm hobbled by LBO debt recently tried to merge with Royal Ahold Edwards, their primary competition in the metro New York area, but was stopped by FTC scrutiny (Orgel 1999, Cotterill 1999a, Cotterill et al., 1999). Prevented from monetizing the excessive and high value that the LBO put on the firm, Pathmark is now restructuring its debt, in effect forcing junk bond holders to absorb losses because the efficiencies and power plays that they believed could cover their cash flow demands when they did the LBO are not available.

The federal and state antitrust agencies now take a much tougher stance towards bailing out financial capitalists than they did in the heyday of LBOs in the 1980's. Industry executives now believe that their enforcement stance is even tougher than the 1990's where divestitures often allowed mergers to go forward (Orgel, 1999, Zwieback, 2000).

IV. **Successive Monopoly/Oligopoly Requires a New Approach to Farm to Retail Price Transmission**

Somewhat endogenous, but important in its own right for the vertical organization and performance of the food sector is prior organization. Our basic point is that the trend towards

tight oligopoly in successive stages of a market channel will influence the continued evolution of this channel's structure and its performance. Research in agricultural economics on cost pass through rates (CPTR), for example, has concentrated almost exclusively on homogeneous products and models that assume for tractability that the market channel is a single industry with competitive firms (e.g. Gardner 1975, Heien 1980, Kinnucan and Forker 1987). Recently McCorriston et al. (1998) relax the competitive assumption, but they continue to maintain the single stage (industry) and homogeneous product assumptions. Outside of agricultural economics Ashenfelter et al. (1998) analyze two types of cost shocks – industry wide and firm specific but they do so only in a residual demand framework for a single stage or industry. Here we advance the theory and empirical analysis by introducing a more disaggregate structural model with firms in a two stage (industry) market channel. We identify cross firm price shocks and corresponding pass through rates as well as industry and firm specific rates. Given an oligopolistic market structure, a firm specific shock not only influences that firm's own price level; it also causes other firms to react to that price and change their prices (Cotterill 1994, 1998, Cotterill et al. 2000). The farm to retail transmission of prices, i.e. the CPTR, is affected by the structure of the market channel.

Assume horizontal competition both at the processing and retail level (a two stage channel) is Nash in prices. Assume also Bertrand price competition exists among retailers. To capture the vertical nature of competition between processors and retailers, we specify three different games: supermarkets with upstream integration (complete vertical coordination game), a two stage vertical Nash model where each supermarket chooses an exclusive processor and processors and retailers maximize profit simultaneously by deciding on the

wholesale and retail price, and a vertical Stackleberg game where in the second stage of the game a retailer decides on the profit maximizing price given a wholesale price and in the first stage of the game a processor maximizes profit by choosing the wholesale price taking into account the reaction function of the retailer.

This model assumes that one has retail data for individual chain supermarkets   (IRI key account data). It also assumes vertical dyadic relationships between processors and retailers, i.e. each retailer deals with one exclusive processor. This is clearly not the case, and is a shortcoming. Other research on vertical structural models has the same constraint (e.g. Kadiyali et al. 1996, 1998). One can allow for more processor interactions via vertical competition for customers by disaggregating the commodity into branded and private label (Cotterill, Putsis and Dhar, 2000). One could continue such disaggregation to the brand level. Then the model would be more disaggregate than the typical firm since a brand is supplied to more than one retailer. In these disaggregate models, modeling competition among processors as a vertical game through retailers rather than a direct horizontal game among processors at the wholesale level seems sufficient and reasonable. Processors compete with each other through retailers in the retail market for the sale of their products.

Let the demand functions of the retailers be the following:

$$q_1 = a_0 + a_1 p_1 + a_2 p_2$$
$$q_2 = b_0 + b_1 p_1 + b_2 p_2$$

[1(a)-(b)]

Processor level demand is derived from the retail level demand specifications given retail conduct and margin. To derive these processor level demand functions different conjectures are assumed at the processor level concerning retailer reactions. These conjectures can be perceived as assumptions by the processors about retailer pricing behavior given a wholesale price. For the vertical integration (full coordination) game we need no vertical conjecture assumptions because the channel has only one industry – integrated retailers.

Let the retailer's cost function be the following:

$$TC_1 = w_1 * q_1$$
$$TC_2 = w_2 * q_2$$

[2(a)-(b)]

where: w_1 and w_2 are the wholesale prices received by the processors.

So, the retailers' profit functions can be written as :

$$\Pi_1^R = (p_1 - w_1)q_1$$
$$\Pi_2^R = (p_2 - w_2)q_2$$

[3(a)-(b)]

Following Choi (1991), in the Vertical Nash game, a linear mark-up at retail is conjectured by the processor on retail price; so, retail price can be written as:

$$p_1 = w_1 + r_1$$
$$p_2 = w_2 + r_2$$

[4(a)-(b)]

where: r_1 and r_2 are the linear mark-ups at the retail level.

In the Stackleberg game, each processor develops a conjecture from the first order condition of the retailer. The retailer's first order conditions are:

$$p_1 = \frac{1}{2}w_1 - a_0 - a_2 p_2$$

$$p_2 = \frac{1}{2}w_2 - b_0 - b_1 p_1$$

[5(a)-(b)]

We assume that each manufacturer only knows its own retailer's reaction function and that the manufacturer ignores impacts of its wholesale price change on the other retail price. The resulting Stackleberg conjectures are: $\left.\frac{\partial p_1}{\partial w_1}\right|_{Conjecture} = \frac{1}{2}$ and $\left.\frac{\partial p_2}{\partial w_2}\right|_{Conjecture} = \frac{1}{2}$.

We simplify the processor level marginal cost function in the following manner:

$$wmc_1 = m + m_1$$

$$wmc_2 = m + m_2$$

[6(a)-(b)]

where: m is the industry specific marginal cost component and m_1 and m_2 are the processor specific cost components.

So, the processors profit functions can be written as:

$$\Pi_1^P = (w_1 - m - m_1)q_1$$

$$\Pi_2^P = (w_2 - m - m_2)q_2$$

[7(a)-(b)]

Using the profit maximizing first order conditions both at the processing and retail level we derive the cost pass through rate (CPTR) equations. They are presented in Table 3. Note that they are only functions of the demand parameters. This is due to the constant marginal cost assumption. Slade (1995), Choi (1991), Cotterill et al. (2000) and others have modeled vertical interaction by assuming that retail sales are made by a monopolist that is supplied by more than one manufacturer. Here we assume the converse (multiple retailers each supplied by a single manufacturer). If in fact our

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retailers are monopolists then the transmission rates in Table 3 for changes in processor's marginal cost are identical for an industry wide change such as the change in the price of a farm commodity, and for a firm specific cost shift, such as a change in labor costs or change due to merger related efficiencies. In the full coordination or vertical integration game we have one monopoly rather than two successive monopolies. With linear demand and constant marginal costs one identically obtains a CPTR = 1/2. For Stackleberg one obtain 1/4 and for vertical Nash one obtains 1/3. Thus the cost pass through rate, or what some call the farm to retail price transmission rate, is a function of the strategic game played, and it is less than the CPTR for perfect competition, which is 1, in this linear demand, constant cost model.

Relaxing the retail monopoly assumption in Table 3 produces cost pass through rates that are functions of the retail demand parameters. Now firm specific and industry wide cost shocks assume different values. The degree of vertical competition still affects the cost pass these rate. This model clearly is suggestive rather than definitive. It demonstrates an important new avenue for research on an old issue (Means 1935) that once again is becoming important, the impact of concentrated food manufacturing and retailing industries on vertical price flexibility, which has a great impact on consumer and farmer welfare.[10]

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[10] Means and subsequent researchers (Greer 1992) focused on the impact of shifts in demand and inflation on price flexibility in a given industry. Here the focus is somewhat different. We are analyzing supply side shocks and the flexibility of prices at successive stages in a marketing channel to supply side shocks. As such our analysts is a supply side version of the Means administered price hypothesis.

The lack of vertical price flexibility means that consumers don't get the signal to switch to other products when supplies are short and they don't get the signal to use more of this product when supply is long. Farmers suffer because their supply condition is ignored. And given rapid technological progress and trade liberalization over supply tends to be the norm. Hog prices fell 39% from September 1997 to September 1998, but retail pork prices for the same period dropped only 1.5% (Tevis, p. 49). A similar problem exists for navel oranges. To raise public knowledge of the inflexible retail price problem Western Grocers publishes weekly farm and retail navel oranges prices on its website, http://www.wga.com. Writing on this issue a *Los Angeles Times* reporter declares.

> "It's been a punishing year for most California orange growers. But you'd never know it by checking out the produce aisle. Although prices paid to farmers for this season's big crop of navel oranges have plunged, supermarket prices in many cases have jumped outpacing even last year when a freeze wiped out two-thirds of the crop. Quality problems and competition from imports have helped drive down farm prices for navel oranges to their lowest levels in years, as little as 6 cents a pound according to the Department of Agriculture. Meanwhile, the major Los Angeles-area supermarkets this week were charging 89 cents to 99 cents a pound for the fruit. The retail price for March is averaging $1.01, according to the Western Growers Association, a produce trade group." (Fulmer)

VI. Shifting Power Balances Drive New Coordination Programs: The U.S. Example

Successive monopoly creates other problems in addition to stagnant or depressed price transmission. As we show below, food retailers and manufacturers as well as farmers and consumers suffer from the inefficiency of

successive monopoly.   Yes, this is correct, everyone loses when successive monopoly exists in a market channel. But do we actually have successive monopoly/oligopoly in the U.S. and Europe? Consider the U.S.

In the 1980s leading food-manufacturing firms enjoyed powerful market positions with strongly differentiated brands supported by significant advertising expenditures. Food manufacturing industries such as carbonated beverages, breakfast cereal, and beer are tight oligopolies that sell highly differentiated brands that have reasonably inelastic (-1.5 to -3.0) brand level demand curves at retail (Tellis, 1988, Cotterill et al. 1996, Langan and Cotterill 1994, Langan 1997, Ma 1997, Nevo 1997, Cotterill and Haller 1997).   The observed brand inelasticity is primarily due to product differentiation, however, some is also due to tacitly coordinated pricing, i.e. price followship tends to reduce brand elasticities (Cotterill et al. 2000). Consumer pull advertising and promotion by the brand manufacturer reduces any bargaining power of buying groups (Cotterill 1997, Gerstner and Hess, 1991). Consumers want the brand so retailers must carry it. Thus each brand tends to be a monopoly; i.e. food manufacturers face brand level demand curves that have sufficient slope to allow profitable pricing above marginal cost.

Retailers also have market power in the local markets where they sell products due to high seller concentration in such local markets (Marion et al. 1979, Weiss, 1989, Cotterill, 1986, 1999a, Foer, 1999, Cotterill et al., 2000). The following quote from Mark Husson, a leading Wall Street analyst of the industry, very bluntly states how supermarkets must continue to expand their

gross and net margins by expanding their market power. He describes the exercise of power as the "gross-margin miracle". Moreover his view of the manufacturers and retailers battle for channel control squares with the analysis presented below in this paper.

> "what has to happen (for stock prices to increase) is it has to become obvious to the (stock) market that supermarket retailers are developing pricing power inside their marketplaces and that there is a structural kind of seismic shift going on in this country in the whole of fast-moving consumer-goods distribution in favor of food retailers, because that's the only way you're going to keep gross margin continuing to move forward.
> If you can find that pricing power and define it somehow as maybe the manufacturer or the consumer losing power; with better organized, more rational competition and more rational pricing, … and if the retailers are developing this pricing power from both sides, along with private brands - and taking control of categories is part of that - then I think there is still some real internal momentum inside the group, which despite the lack of inflation can keep this gross-margin miracle still moving forward." (*Supermarket News*)

Since food retailing is a slow growing business, gross margin expansion via increased exercise of market power is the only fundamental strategy available to increase stock prices. In conclusion, we now have a food system that is predominantly served by powerful food manufacturers selling to powerful food retailers. The same is true in Europe. The successive monopoly model of the distribution channel captures the essence of the channel coordination problem in the U.S. and in individual European countries.

Spengler (1950) was the first to analyze the impact of successive monopoly on channel coordination and economic efficiency. Figure 2 can be

used to explain the problem.[11] D_r is the retailers demand curve. MR_r is the corresponding retail marginal revenue curve. If we assume, without loss of generality and for ease of illustration, that the retailer has a fixed cost of retailing and that the only variable cost is the purchase of the product Q, then the retailers marginal cost is the manufacturer price, w. Since a profit maximizing retailer always equates marginal revenue and marginal cost ($MR_r = w$) the retailers marginal revenue curve is the demand curve for Q at the manufacturer level. The manufacturer therefore equates the marginal revenue of the retailers input demand curve (MR_m) to its marginal cost of manufacturing the product. In other words, the manufacturer computes the marginal revenue of the retailer's marginal revenue, hence the name double marginalization. In Figure 6 the profit maximizing manufacturer offers quantity q_2 at price $p_1 = w$, and the profit maximizing retailer sells this quantity at price p_2. This is the Vertical Nash, "arms length pricing," solution of the previous section. If the two firms integrated the new single monopolist would maximize profits by lowering price to p_1 and selling q_1. This is the fully coordinated solution of the previous section. The integrated firm's total profits are greater than the profits of the two successive monopolists.

The implications of this double marginalization phenomena are very real for the US food marketing system today. Food manufacturers and food retailers, can in fact, increase their profits if they discard independent (vertical

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[11] This analysis of double marginalization to explain formally the role of trade promotions and private labels in the food system was first presented in Cotterill (1999d).

Nash) pricing practices and talk to each other to coordinate pricing and other terms of trade. The vertical Stackleberg and full coordination games of the prior section are two possibilities. The double marginalization model predicts that vertical coordination will increase channel profits and lower prices to consumers. This is a very rare win-win situation in economics, the "dismal science" of trade offs! A shift from 2 monopolies to 1 monopoly is good for everyone. Another possibility that is better for farmers and consumers but worse for the middlemen is competition at both manufacturing and retailing. Of course, this is the goal of public policy, including antitrust.

With this economic model one can begin to understand strategic moves such as the efficient consumer response (ECR) program with its everyday low pricing (EDLP) component. ECR moves to improve the logistical flow of products through the system, such as just-in-time inventory management procedures, have been successful because they reduce cost. However, one of the largest projected savings due to the innovation of ECR was related to the elimination of stop-go price promotions via the establishment of everyday low prices (EDLP) throughout the food system. EDLP has not worked and savings due to smoother product flow haven't accrued. EDLP has failed in the United States precisely because as implemented to date it has tended to be a vertical Nash pricing program. Trade promotion programs on the other hand reduce double marginalization in the channel.

Consider Figure 3. Assume that the manufacturer is the channel captain and as much initiates a trade promotion. The manufacturer can offer

product to the retailer on the condition that it be promoted at price p_1 the channel profit-maximizing price.   To obtain the retailers cooperation, the manufacturer need only lower w to a level that increases the retailer's profits from the nonpromoted level. Figure 3 illustrates a trade promotion's impact on prices and profits. At the nonpromoted retail price level, p_2, the manufacturer has profits equal to the area, $wbde$. The retailer earns profits equal to area, $p_2abw.$ With promotion the retailer agrees to sell at p_1 and the manufacturer lowers the wholesale price to w_1.   The retailer participates in the trade promotion because its profits, area p_1fiw_1, are greater than its nonpromotion profits, area p_2abw.   Manufacturer profits under promotion are area w_1ige, which is larger than nonpromotion profits, $wbde$.

Under the trade promotion scenario both the manufacturer and retailer share the increased profits due to the elimination of double marginalization. Exactly how much each gets depends on their bargaining ability, which is a function of their knowledge. The manufacturer knows its costs, and in the U.S. with access to Ips, A.C. Neilsen scanner data, knows demand conditions as well. Manufacturers probably benefit most from promotions.

Why, one might ask would one not see a permanent trade promotion, i.e. EDLP, since it improves both players profits? Technically one should in fact observe such.   One could argue that this is evidence against successive monopoly, however other factors are clearly at work.

One other factor is the retailers option to do private label. That strategy can dominate participation in a trade promotion. A retailer is not going to

participate permanently in a trade promotion because it kills its private label program, a program that captures a higher share of the channel's profits. If the retailer can introduce a private label product of equal quality and consumer acceptance, i.e. a product that destroys all manufacturer brand equity built up due to advertising, product trademarks, and design, the retailer can appropriate all of the profits earned at p_1q_1 in Figures 2 and 3. Private label products, however, rarely are so successful that they eliminate manufacturer brands. Nonetheless, they clearly diminish national brand pricing power (Cotterill et al. 2000). Trade promotion by manufacturers reduces the incentives for development of private labels, and the amount of brand equity that manufacturers have created also affects retailer's ability to introduce private label products. One cannot analyze private label pricing or trade promotions in a vacuum. The rapid growth of private label products in the 1990's is in large part due to the problem of successive monopoly in the food system.

Having dismissed EDLP as a failure due to its inability to solve channel coordination problems during the 1990's, looking forward things may be different if WalMart continues its advance. WalMart does a permanent trade promotion, i.e. it is EDLP. Research is needed on WalMart's pricing practices, however it appears that they assure the channel captain role and dictate terms to manufacturers. Walmart's EDLP prices are at or near the single monopoly level on a permanent basis. Walmart and its suppliers seem able to give up the

merchandising excitement and the communication of price outs that stop-go trade promotions offer.

This is due in no small part to Walmart's reputation as a no frills, no bull (trade puffery) retailer. Their procurement strategy in meat for example, vertically forcloses the market in a fashion that reduces the need for trade and consumer marketing programs (costly competition) by meat processors and increases processor margins. Walmart (at least in New England) carries only Purdue fresh chicken, only Tyson frozen chicken and only Smithfield fresh pork. These vertically coordinated meat firms with branded products do not have to compete with unbranded meats or each others in the case of chicken.

VII. An Out of the Box Solution: Truly National Supermarket Chains

Moves to improve channel coordination and pricing efficiency such as trade promotions, ECR, category management, and copycat private label programs are "in the box" solutions. They don't challenge the structure of the food-marketing channel, essentially leaving the food-manufacturing firms intact and in control of the content of the system. Although U.S. supermarket chains are larger in absolute size than their European markets counterparts, and they dominate regions of the U.S. comparable in size to many European countries, unlike many European supermarket chains they have not established themselves as channel captains by instituting strong retail brands via supply chain management programs.[12] In the U.S. this is an "out of the box" move that would diminish the position and stock market value of large

U.S. food manufacturers. The breakfast cereal industry has experienced a very strong taste of this since 1995 (Cotterill, 1999b). Box 1 provides the executive summary from a very insightful paper written by Richard Bell, Institute of Retailing, Oxford University that focuses on the current status of European food distribution. Leading supermarket chains in Europe are clearly the channel captains, and their market power continues to increase. Leading manufacturer brands no longer automatically command distribution. Retailers are branding their stores and their own label lines. In the U.S. even Walmart has not yet aggressively pursued this strategy. National brands, cheap, has been their primary focus to date.

Box 1: EXECUTIVE SUMMARY: THE CHALLENGE OF FOOD DISTRIBUTION (IN EUROPE)

1. The process of distribution has developed from a conduit between the functions of production and consumption to a position where it exerts considerable influence on both the process of production and the pattern of consumption.
2. Product brand owners can no longer presume that numerical distribution will occur automatically given brand awareness and product acceptance.
3. The structure of retailing in most countries of European Union countries is largely oligopolistic and the level of concentration continues to increase.
4. Information technology, led by epos data, has enabled retailers to integrate the process of distribution and reverse the supply chain from producer push to consumer pull.
5. Retailers are now vertically integrated with dedicated distribution systems substantially replacing the role of the wholesaler. This has further disadvantaged small retailers, and created an effective entry barrier.
6. Retailers are now seeking strategic alliances to allow them to maximise the utilisation of their logistics infrastructure and their buying power. The UK and US are now experiencing horizontal integration of the replenishment process.

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[12] Cotterill (1997) discusses this option and whether developed nations' food systems might converge to it. See Wrigley (1999), a leading British geographer, for a very interesting European perspective on the transformation of U.S. food retailing.

7. Food retailers have developed large surface out of town sites which have increased consumer search costs. Each site contains just one food retailer thus minimising the opportunity for consumers to compare prices. The combined effect of these developments is a reduced ability for the consumer to switch between stores and, as a consequence, a greater willingness to purchase substitute products.

8. Grocery retailers are developing their chains into retail brands thus differentiating themselves from their competitors. The manifestation is the growth of private label products and increased selective listing of branded items. The effect is reduced head-to-head price competition.

9. The benefit of product branding is that the manufacturer has controlled most of the down and up stream variables through the bond of the brand with the consumer. Retailers now control the in-store marketing levers and act as gatekeeper to the consumer. This, together with their up-stream control, weakens the control of the product brand owner.

10. The manufacturer is now confronted by:- the conflicting demands of individual retailer driven supply chains; the loss of control of the in-store marketing levers (for which category management is a partial response); a situation where the customer is also competitor (through private label); and an adverse tilting in the balance of information availability.

11. Patterns of ownership and financial control of many continental European retailers preclude them from achieving all of the benefits of vertical integration that are available to Walmart and leading British food retailers. They are thus disadvantaged as Walmart enters European markets.

12. New channels of distribution are opening, driven by changes in consumer lifestyle and developments in information technology. The pace of development is retarded by site availability (partially through the land planning process) and the practical difficulties of delivering perishable items for daily consumption via the Internet.

13. Competition authorities are taking an increasing interest in the oligopolistic structure of food retailing; but their criteria is consumer welfare rather than producer protection.

Source: Bell, Richard. 2000. The Challenge of Food Distribution. In *The Future of the Global Food Industry-Strategic Directions*, B. Ramsay, ed. Financial Times Retail and Consumer Publishing Monograph Series: London.

The next phase in the U.S. food system may well be the harbinger of such a radical shift in economic fortunes. That phase could be the emergence of truly national supermarket chains, something never seen in the U.S. In the near future, we undoubtedly will see more mergers among the top 10

supermarket chains. Since this is an "out of the box" solution, lets speculate on some feasible geographic combinations that would assemble truly national chains with significant national market shares. If Kroger, Safeway, Winn Dixie and Shaws (Midwest, West, South, and Northeast) combined, the resulting company would be truly national in scope with sales of $86.4 billion and a national market share of 21.5%.[13] A second combination could be Albertsons, Ahold, Food Lion, and Meijer (West, East, South and Midwest). It would have sales of $77.9 billion and a national market share of 19.3 percent. These two mammoth chains would account for slightly over 40 percent of supermarket sales. Walmart's much ballyhooed expansion by building supercenters is trivial in comparison. A third combination could assemble another 20 percent firm in response to these conjectured consolidations. These three firms plus a larger Walmart, e.g. 10 percent SOM, based on only its food sales, would put national four-firm concentration at 70 percent. Today (Spring 2000) the top 4 chains (Kroger; Walmart; Albertsons and Safeway) control 43% of supermarket sales. Add Royal Ahold and Del Haize and the top 6 control 52.6%.[14]

Before discussing the impacts of this new higher level of national concentration, one might ask would the state and federal antitrust agencies allow such mergers? Under the current guidelines and case law they probably would because they are classified as market extension mergers that have no impact on retail concentration in local markets. In other words they do not

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[13] The 1999 market shares for this exercise are from Cotterill (2000).

[14] These spring 2000 shares are from Franklin (2000). Recently Royal Ahold moved into the food service area by acquiring the second largest firm, U.S. Foodservice, with $7.0 billion in sales (U.S. Foodservice). Combined with its retail sales of $20.3 billion in 1999, this clearly increases Royal Aholds buying power.

seem to effect consumer prices. This may very well be a faulty conclusion. There is a need for monopsony/oligopsony merger guidelines to refocus the analysis on the supply side of these mergers and their impacts upon farmers as well as consumers. For example, 6 firms that control over 50% of the nation's supermarkets sales, are absolutely critical to the performance of a food product that seeks nationwide distribution. Buyer concentration may affect performance at levels well below the seller concentration cutoffs in the horizontal merger guidelines. Barriers to entry in this national buyers market are clearly higher than they are in any local food market. Finally the pricing dynamics of the procurement market can spill over to affect competition in retail markets.

The recent rise in "slotting fees" is an example of how buying power affects retail prices. Many analysts regard slotting fees as rent for scarce shelf space. This approach, however essentially assumes no retail buying power. Clearly this is not the case. Firms with a large share of the national market or regional firms can extract slotting fees because manufacturers have no other channel to a major share of consumers. If markets were competitive slotting fees would be minimal and at best cover only the cost of adding and possibly withdrawing a new product.

Recently, the American Antitrust Institute (AAI) and Wakefern Food Corporation, Elizabeth, New Jersey, the nation's largest retailer-owned cooperative wholesale, petitioned the FTC on, these issue. The AAI is

concerned that recent mergers have, in fact, generated sufficient size disparity in the supermarket industry to trigger Robinson Patman claims:

> "What we are calling the mega-chains–the five largest retail grocery sellers–exercise enormous buying power, which they employ against the food producers and manufacturers. The sheer size of the mega-chains looms as a lever–the manufacturers must get their products onto the shelves of the largest retailers, even if they have to pay higher, even exorbitant, slotting and other allowances and make other costly concessions–which they are forced to do. As a result, manufacturers may raise their prices to all customers in order to earn an acceptable return on investment. In that case, all other customers subsidize the mega-chains. ...smaller customers are always at a competitive disadvantage, because they are not receiving the higher allowances and other concessions, which effectively raises their cost of goods."(Foer, 1999, p.7).

The R-P Act may come to the forefront after decades of relatively inactive and marginal enforcement.[15] It gives retailers (read smaller ones) legal recourse against manufacturers that grant discounts to other retailers (read larger ones) that are not cost justified. Under a rejuvenated Robinson-Patman Act, manufacturers would have three options: either give all retailers non-cost justified discounts that large retailers demand, use the "targeted marketing" programs of third party firms to offer benefits to favored retailers, or give no discounts.

Examples of the second option include Catalina's check-out coupon program and Actmedia's in store at shelf coupon dispensing machines and Priceline.com's web house grocery program. These programs are chain specific,

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[15] The AAI argument dovetails with the successive monopoly model. Slotting fees are not moves to eliminate double marginalization. To sustain monopoly at the retail level leading supermarket chains prefer a system that limits the competitive fringe. To the extent that manufacturers raise fringe supermarkets cost of goods sold relative to leading supermarkets the power of the latter is enhanced (Salop and Scheffman 1987). The practice also acts as a barrier to small food manufacturers seeking to expand. See Wier, 2000 for a report on recent Senate hearings on slotting.

i.e. they are not market wide such as a free standing insert of coupons in a local newspaper. Thus, a manufacturer is offering a price discount only to consumers who shop at a particular chain. This increases that chain's movement and profitability but not its competitors. Any rejuvenation of the Robinson-Patman Act will have to address the issue of access to third party programs by independent operators and smaller chains.

The last option (giving no discounts) may not be sustainable in the long run if the truly national chains can go out of the box. They may develop strong retail brands that supplant or at least significantly curtail time honored manufacturer brands. Leading manufacturers and smaller retail chains would both lose position in the food system.

Whether large chains can succeed in branding depends upon the trade off between economies of specialization versus economies of scope in branding food products. As such it is a fitting end to this paper, a paper that began with Adam Smith's observations on economies of specialization.[16] Does a company such as Kellogg's or Campbell's have a competitive advantage in branding new products in cereal or soups, or does a truly national supermarket chain have the edge because of scope economies? If advertising is losing its punch due to new technologies, then the era of branding food products with TV media may be over (see Box 2).

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[16] Economies of scale and scope in production and distribution here, however, are not an issue. Branded food companies, for example, in fruits, vegetables and cheese have spun off production to agricultural cooperatives. They buy the product as a graded commodity and

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Box 2: Goodbye to Advertising As We Know It

"Thanks to smart new VCR-like machines from Silicon Valley, the viewer is king, media moguls are fretting, and advertisers are terrified. A DVR (Digital Video Recorder) incorporates a hard-disk drive, a modem, and silicon circuitry. It converts TV programs entering your home via cable, satellite dish, or antenna into digital bits (up to 30 hours' worth) that the hard drive can store for you to view at your convenience... It's a Trojan horse that could surprise...advertisers with radical change... That's because, yes, DVRs let you skip commercials with ease. Forrester Research of Cambridge, Mass., predicts that 13% of U.S. households will have one by 2004, an adoption rate faster than that of VCRs." (Schlender 1999)

If a retailer can establish a uniform high quality reputation across several categories, the retailer name alone would be the brand, and it would be transferable to new product categories (Bell, 2000., Cotterill, 1997).

Underlying this economy of scope argument is the supposition that truly national chains could develop extensive managerial cadre that could work with smaller manufacturers in a supply chain management context to produce and market truly innovative new foods and high quality established foods. Many of them may be fresh or chilled or ready to eat prepared entrees. Truly national chains could make more effective use of TV media that is segmented along demographic rather than geographic lines. These chains would not rely on leading manufacturer brands to do category management. Their own management would do it.

Fundamentally, the battle for channel control distills down to whether large old-line food manufacturers, or new retailer "product development and

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then put their brand on it. Supermarkets in Europe do the same with their supply chain management approach.

marketing" departments working with smaller possibly more experimental and entrepreneurial food manufacturers can be the most innovative and creative. Adam Smith and George Stigler could appreciate this 21st century version of the economic organization problem.

Picture 1. The A&P Chain Store on Main Street, Mystic Connecticut, 1940.

Source: Mystic Connecticut Historical Society.

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Table 1: Evolution of the Food Industries in the U.S. and Europe

Phase	Structure	Scope	Competitive environment	Control of supply chain	Degree of marketing sophistication	Consumer demand
I. The era of early Competition 1900-1920	Small-medium-sized firms	Local/regional within one country but for commodity movement by _____	Best example of 'perfect' competition after farming, entrepreneurial	Run by regional wholesalers	Limited branding, mainly commodities	Food a major part of disposable income - up to 50% in some countries
II. National Consolidation 1920-1945	Rise of large manufacturers via publicly owned connections with many small processors and retailers	Move to national/ major regional level in one country Limited export	'Imperfect' competition and start of acquisition activity. Food manufacturing an important factor in national economies	Run by national manufacturers with wholesaler and retail chain support	Rise of national branding, sales, income advertising and R&D private label appears	Rise in per capita income and demand for wide range of branded convenience foods
III. Internationalization 1945-1980	Mix of publicly owned Manufacturing oligopolies, retailer chains concentration, and many smaller entrepreneurs	Multinational expansion of major manufacturers with significant increase in turnover	Golden Age of manufacturer branding and mass marketing.	National manufacturers dominate but some retail challenge resulting from concentration	Brand management at national and international level. Increased demand for market data/information	Food expenditure declines as Percentage of disposable income. Move to larger retail outlets. Growth of eating out
IV. Globalization 1980-2000	Polarization of manufacturing and retailer structures via concentration, acquisition and divestment	Manufacturers extend globally and retailers go multinational	Retailer branding increases level of penetration and begins to challenge manufacturer branding. Both now 'oligopolistic'	Supply chain in Europe run by retailers and challenging for dominance in North America	Major manufacturers identify core categories. Super-stores, retailer brands, address rising vertical coordination issues in a concentrated channel, Internet Grocers	Turnover in foodservice now challenging for leadership as slow-down in food sales at retail

Adapted from: Bill Ramsey, ed., *The Global Food Industry*, Financial Times Business Ltd., London 2000, p. 7.

Table 2. Determinants of Economic Organization

Factor	Impacts
Economic growth Urbanization Transportation Communication	Increases specialization, incomes, and exchange, i.e. larger markets allow for the spin off of new industries and new market channels
Technical progress in areas Including transport and Communication	Lower costs of production, creates new products, improves quality of old, creates new industries and new market channels
Changes in culture, and social structure (changing role of men, women, children, minorities, seniors, and leisure time)	Creates a demand for new products and new marketing channels for distribution of old and new products, affects the deployment of labor
Deep, unfettered capital markets	Strong drive for technical efficiency and market power generates strategic moves: mergers, acquisitions, leveraged buyouts, leveraged capitalizations
Rise of particular organizations, e.g. tight oligopolies in one or more stages of the market channel	Leads to vertical integration or coordination
Public Policy	Antitrust policy seek to sustain the economic organization that ensures benefits of technical progress are passed on to consumers, and that ensures effectively competitive prices so that resources are allocated in a reasonably efficient manner with the CAVEAT that farm income be sustained at an acceptable level.

Table – 3: Cost Pass Through Rate Equations For Two Processors and Two Retailers:

Cost Pass Through Rates		Vertical Nash	Value if, Retail Monopolies a_2 and $b_1 = 0$	Vertical Stackelberg	Value if, Retail Monopolies a_2 and $b_1 = 0$	Vertical Coordination	Value if, Retail Monopolies a_2 and $b_1 = 0$
Effect of Farm Price Change on Retail Price of 1	$\dfrac{dp_1}{dm}$	$\dfrac{(3a_1 - 2a_2)b_2}{9a_1b_2 - 4a_2b_1}$	$\dfrac{1}{3}$	$\dfrac{(4a_1 - 3a_2)b_2}{16a_1b_2 - 9a_2b_1}$	$\dfrac{1}{4}$	$\dfrac{b_2(2a_1 - a_2)}{4a_1b_2 - a_2b_1}$	$\dfrac{1}{2}$
Effect of Farm Price Change on Retail Price of 1	$\dfrac{dp_2}{dm}$	$\dfrac{(3b_2 - 2b_1)a_1}{9a_1b_2 - 4a_2b_1}$	$\dfrac{1}{3}$	$\dfrac{(4b_2 - 3b_1)a_1}{16a_1b_2 - 9a_2b_1}$	$\dfrac{1}{4}$	$\dfrac{a_1(2b_2 - b_1)}{4a_1b_2 - a_2b_1}$	$\dfrac{1}{2}$
Effect of Firm 1 Specific Cost Change on Retail Price 1	$\dfrac{dp_1}{dm_1}$	$\dfrac{3a_1b_2}{9a_1b_2 - 4a_2b_1}$	$\dfrac{1}{3}$	$\dfrac{4a_1b_2}{16a_1b_2 - 9a_2b_1}$	$\dfrac{1}{4}$	$\dfrac{2a_1b_2}{4a_1b_2 - a_2b_1}$	$\dfrac{1}{2}$
Effect of Firm 1 Specific Cost Change on Retail Price 2	$\dfrac{dp_2}{dm_1}$	$\dfrac{-2a_1b_1}{9a_1b_2 - 4a_2b_1}$	0	$\dfrac{-3a_1b_1}{16a_1b_2 - 9a_2b_1}$	0	$\dfrac{-a_1b_1}{4a_1b_2 - a_2b_1}$	0
Effect of Firm 2 Specific Cost Change on Retail Price 1	$\dfrac{dp_1}{dm_2}$	$\dfrac{-2a_2b_2}{9a_1b_2 - 4a_2b_1}$	0	$\dfrac{-3a_2b_2}{16a_1b_2 - 9a_2b_1}$	0	$\dfrac{-a_2b_2}{4a_1b_2 - a_2b_1}$	0
Effect of Firm 2 Specific Cost Change on Retail Price 2	$\dfrac{dp_2}{dm_2}$	$\dfrac{3a_1b_2}{9a_1b_2 - 4a_2b_1}$	$\dfrac{1}{3}$	$\dfrac{4a_1b_2}{16a_1b_2 - 9a_2b_1}$	$\dfrac{1}{4}$	$\dfrac{2a_1b_2}{4a_1b_2 - a_2b_1}$	$\dfrac{1}{2}$

Figure 1. Stigler's Functional Cost Theory of Vertical Market Structure
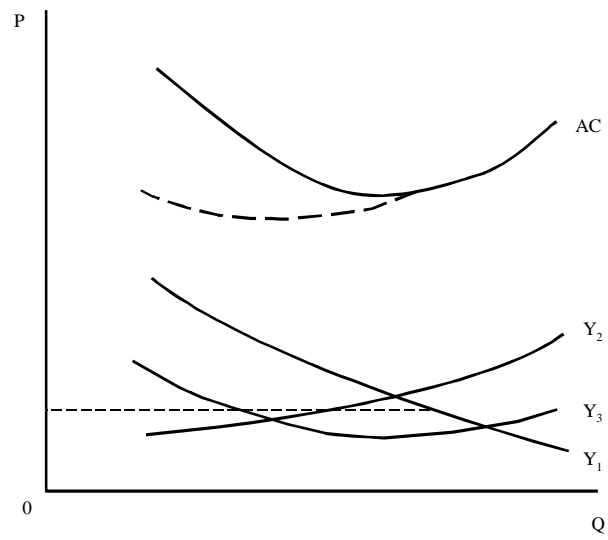
Source: Stigler, G. J. 1951. p. 187.

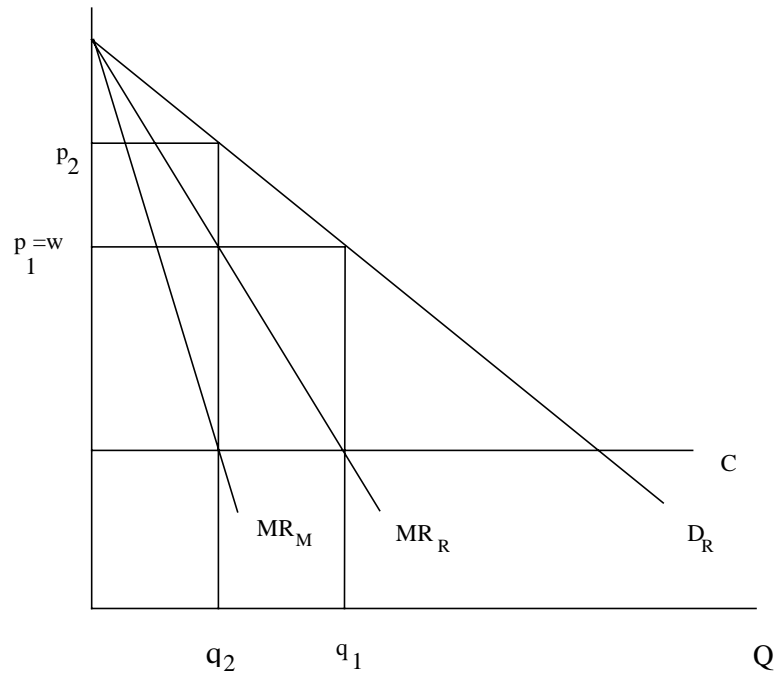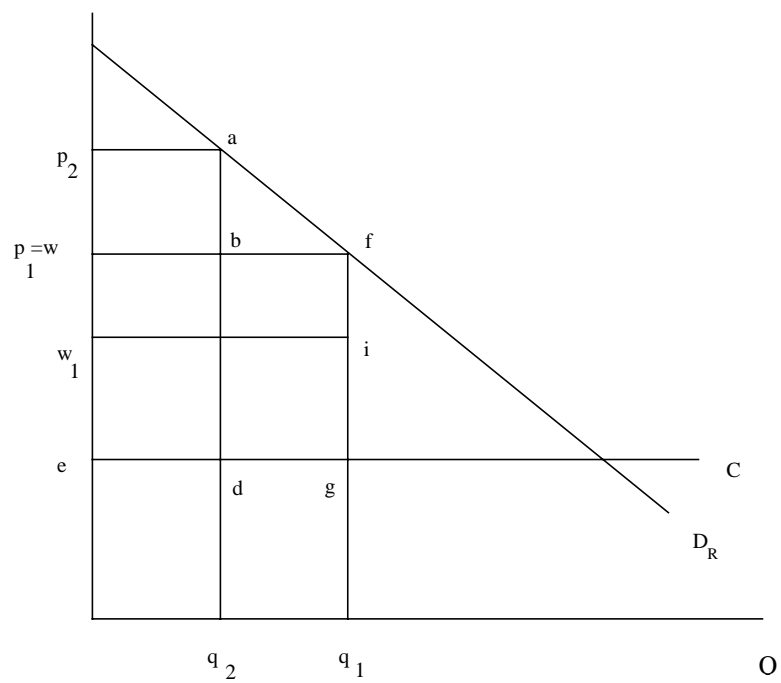Figure 2. The Problem of Channel Coordination: Successive Monopoly

Figure 3. Elimination of Double Marginalization by Trade Promotion

Appendix

Stock Price Charts for Selected Leading Food Manufacturing,
Retailers and Internet Startups

1.   Food Manufacturers
         Nabisco
         Philip Morris
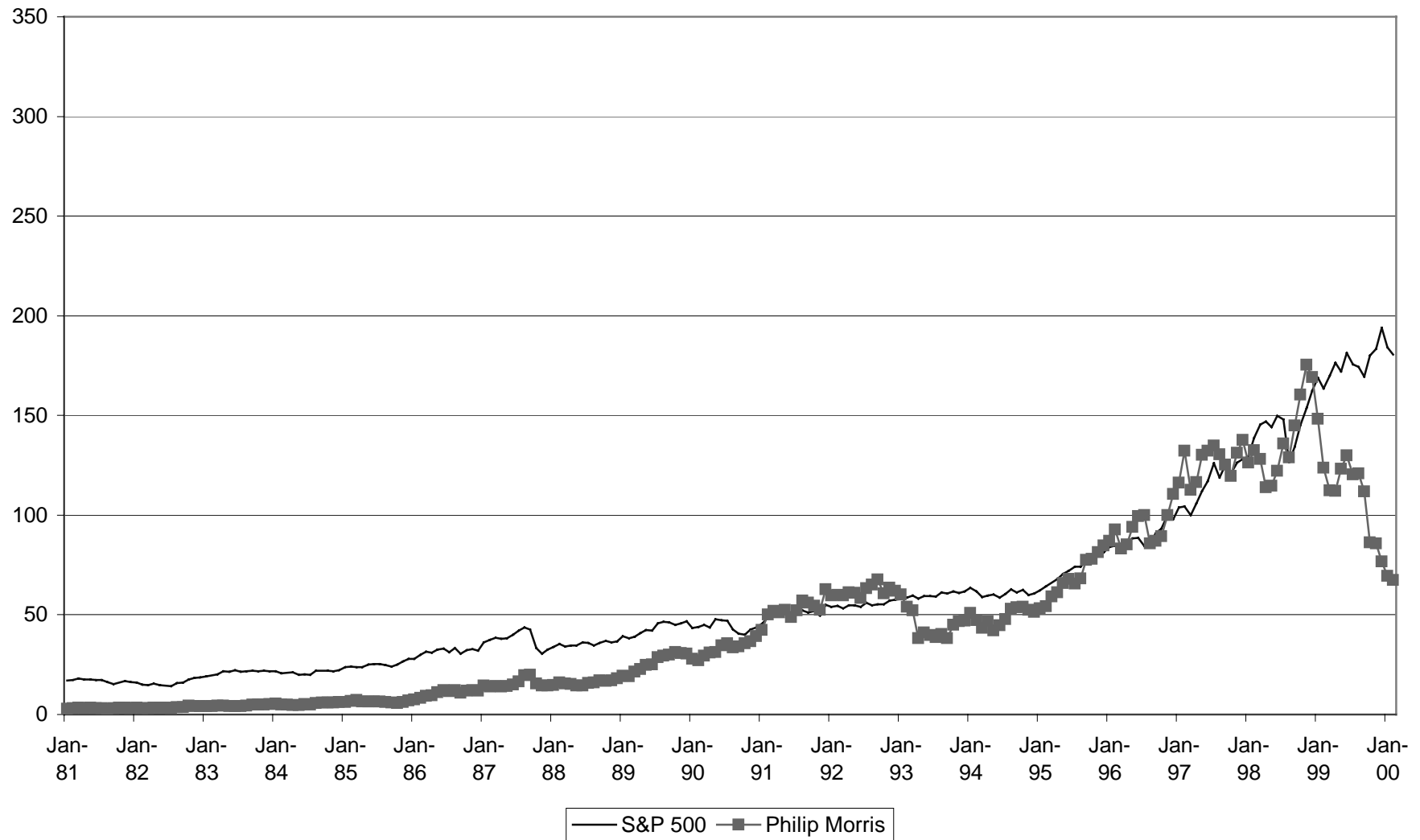   Coca Cola
         Pepsico
         Kellogg
         General Mills
         Danone
         Nestle
         Unilever

2.   Food Retailers
         Safeway
         Kroger
         Royal Ahold
         Wal-Mart

3.   Internet Grocers
         Webvan
         PeaPod
         Streamline.com
         Homegrocer.com

Philip Morris vs. S&P 500 Price Index
November 1996 = 100

Danone vs. S&P 500 Price Index
November 1996 = 100
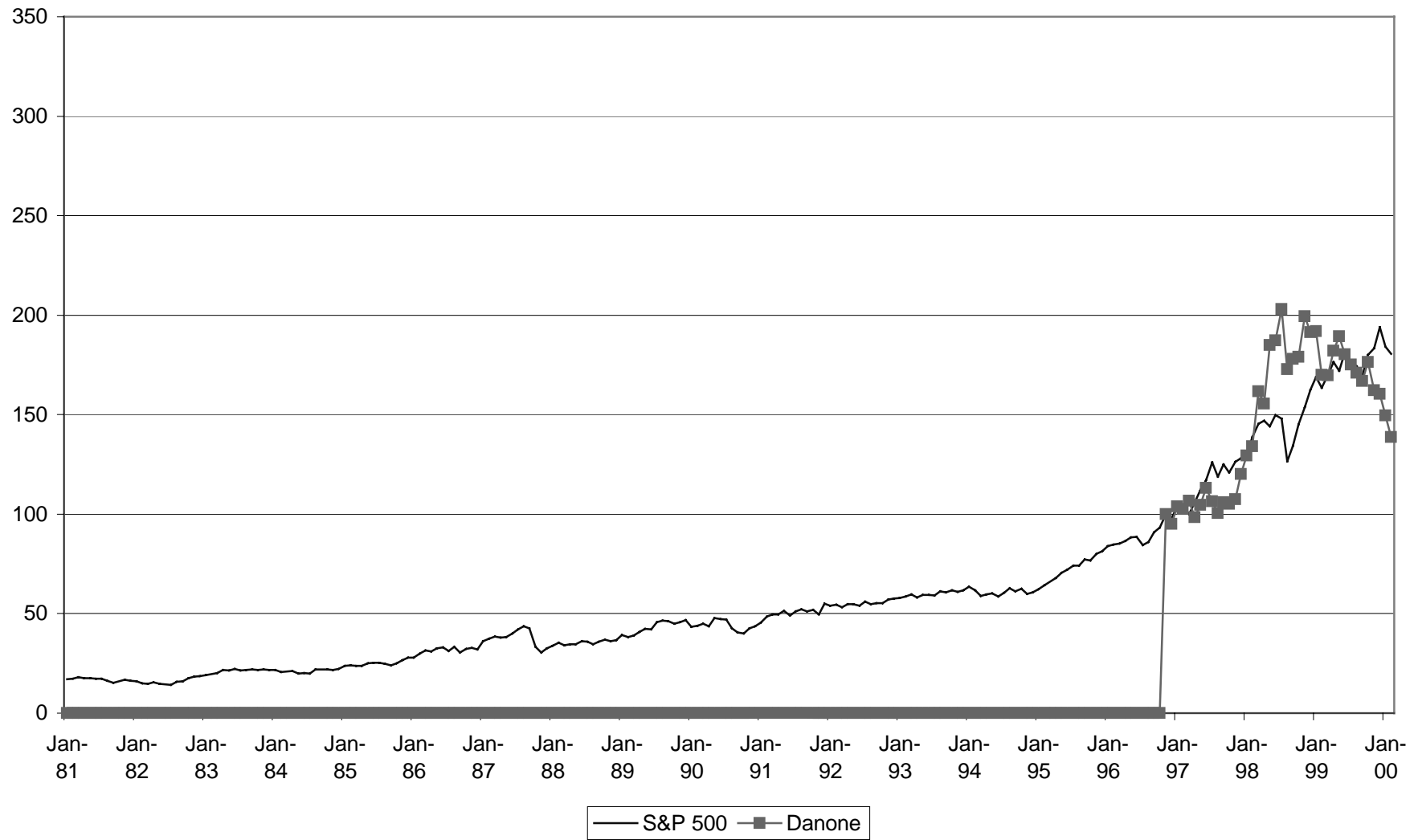
Nestle vs. S&P 500 Price Index
November 1996 = 100
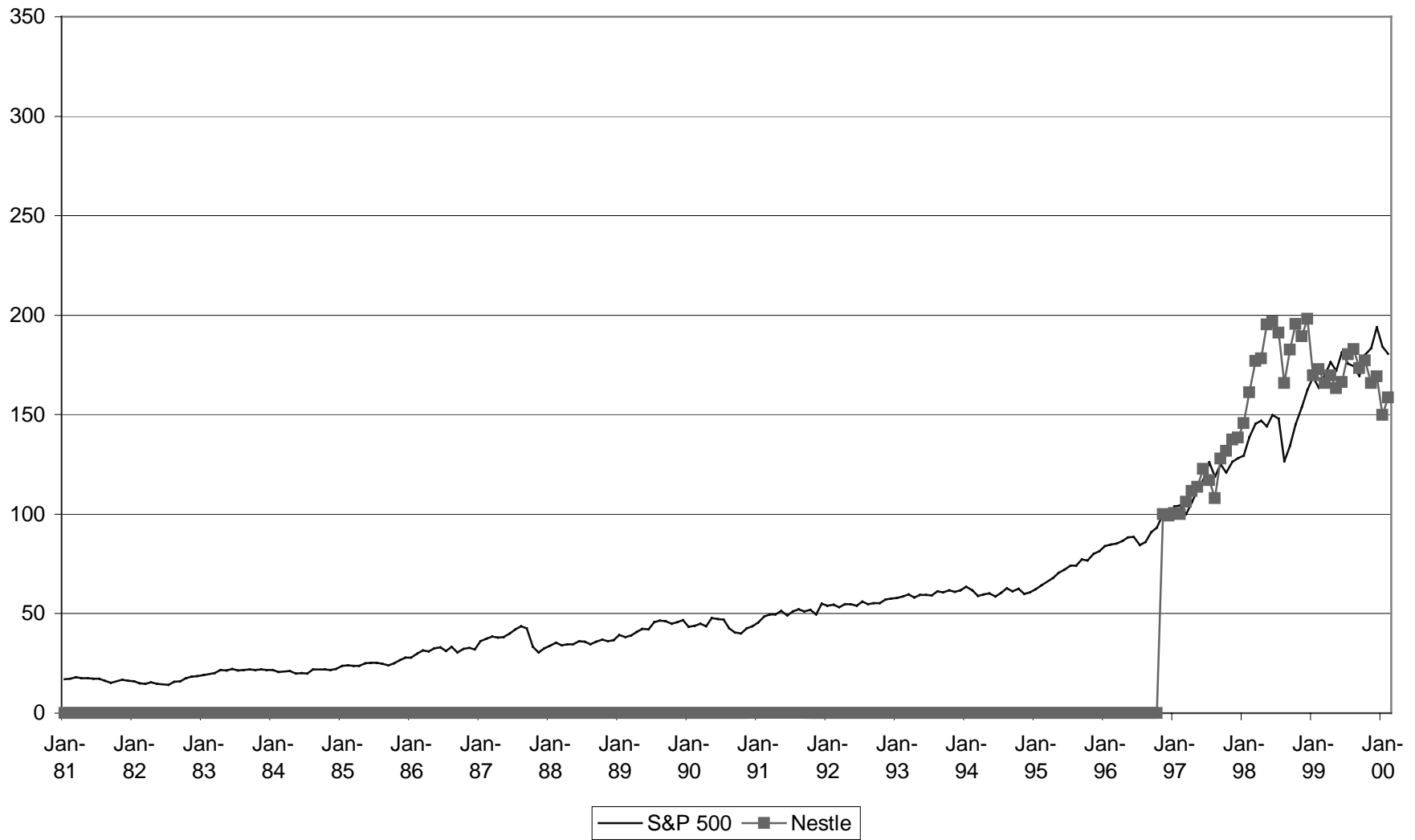
Unilever vs. S&P 500 Price Index
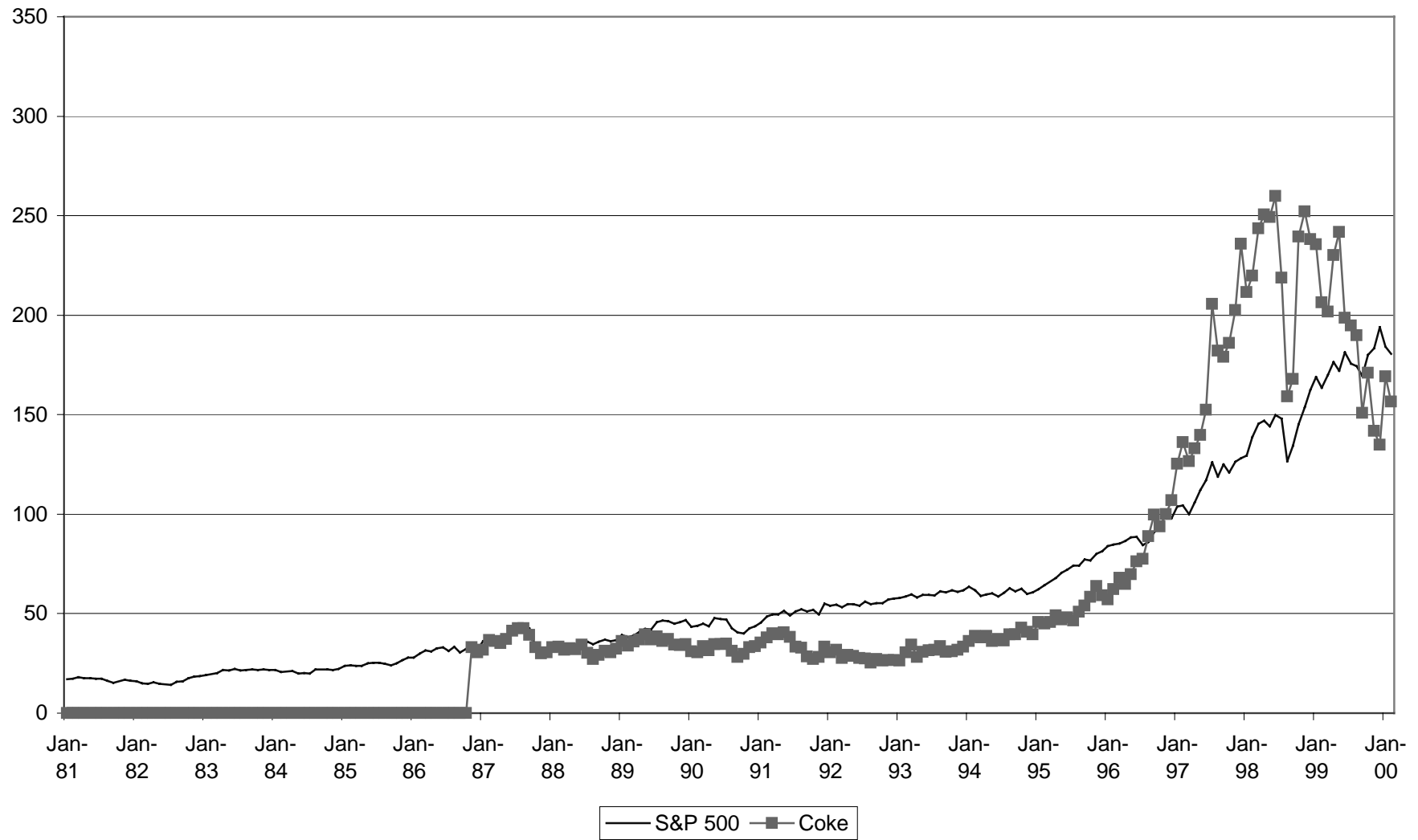## November 1996 = 100
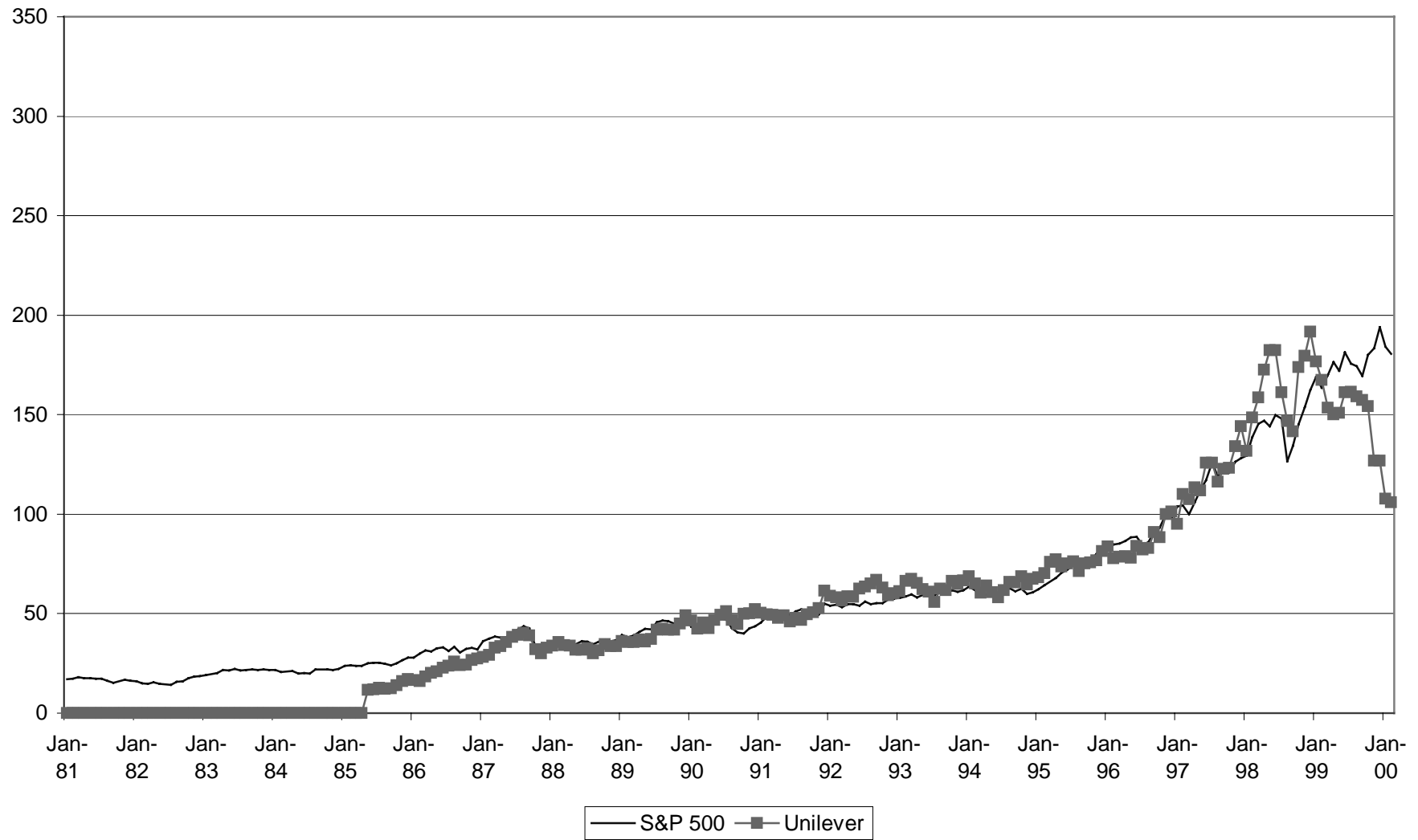
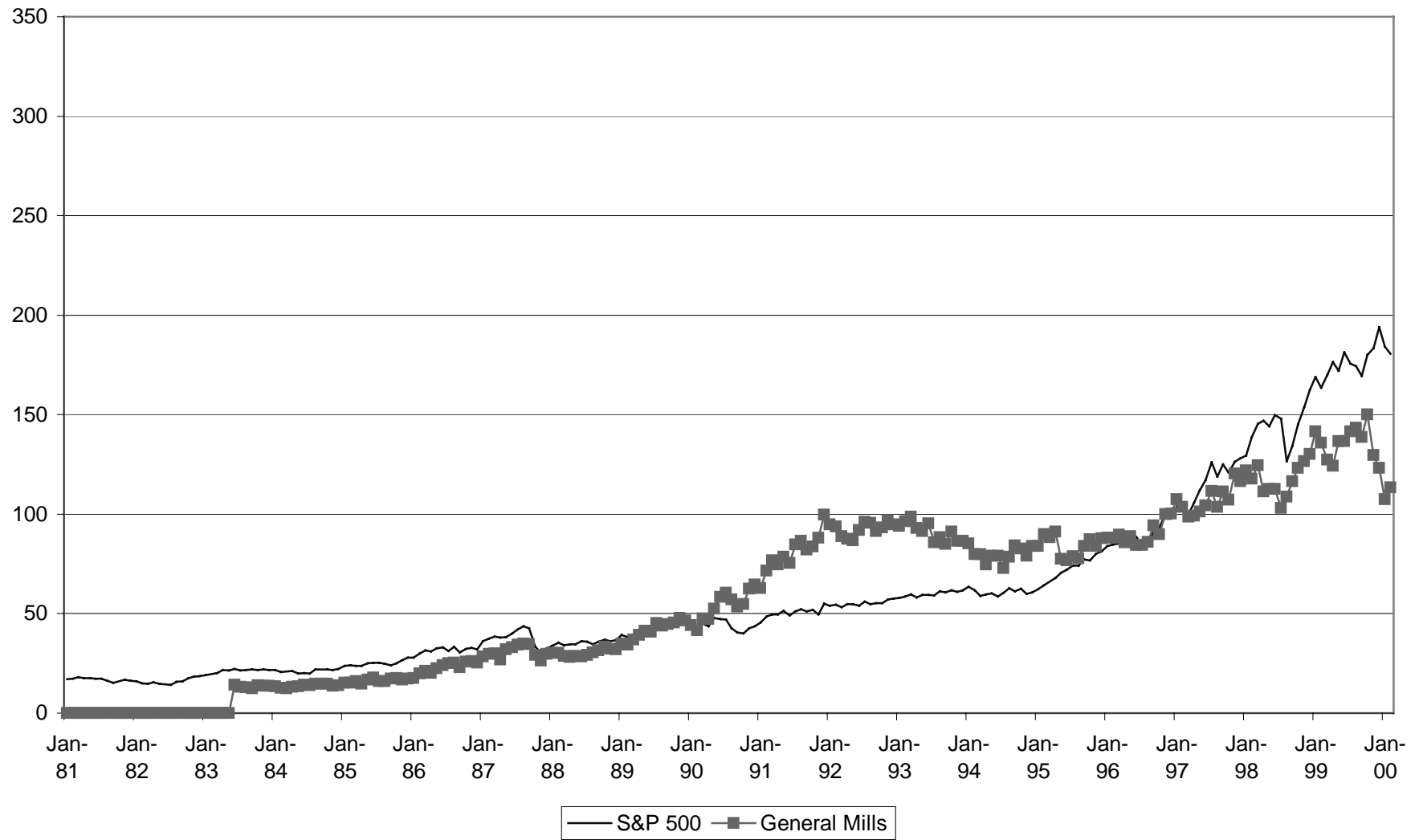# Pepsico vs. S&P 500 Price Index
November 1996 = 100
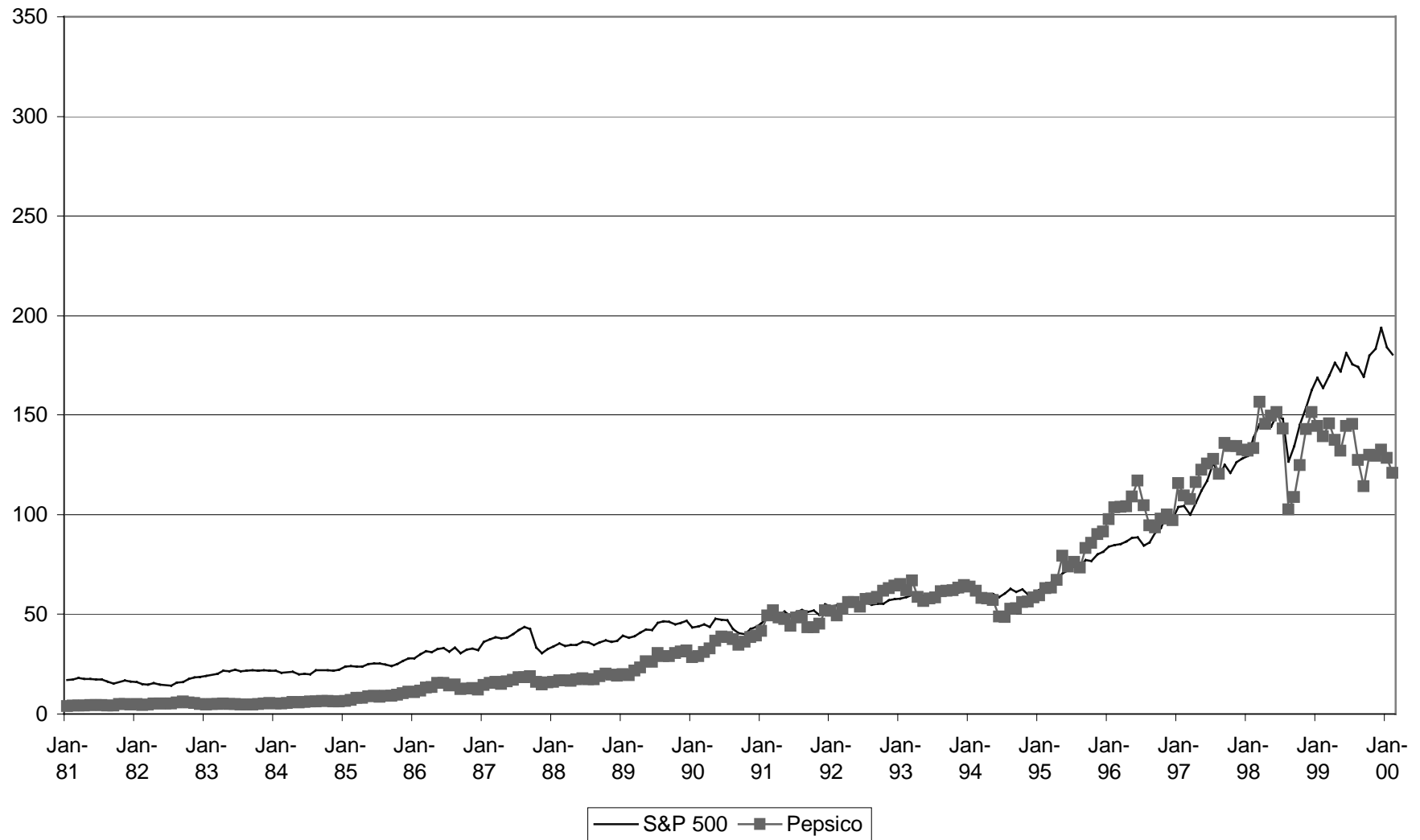
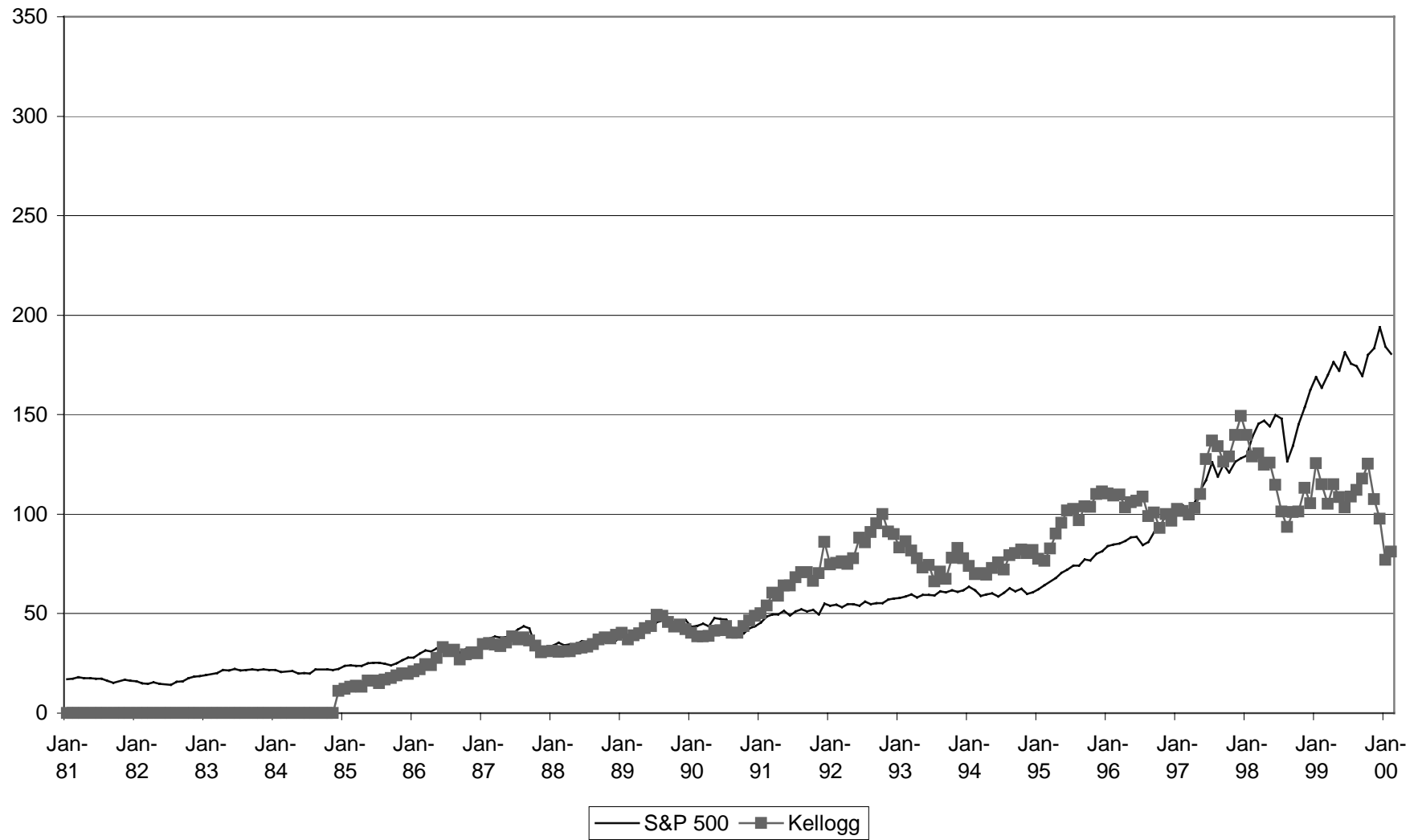# Nabisco vs. S&P 500 Price Index
November 1996 = 100
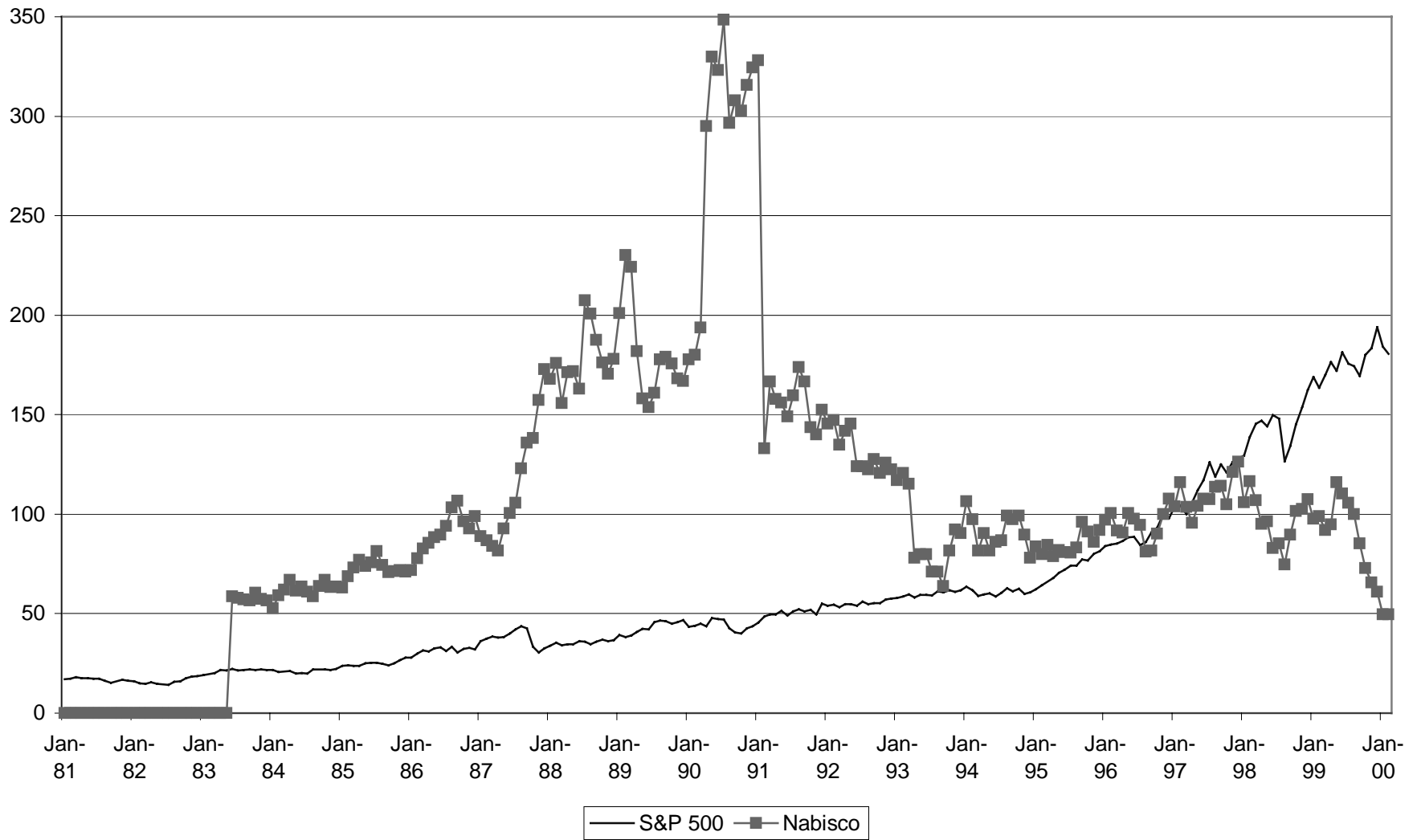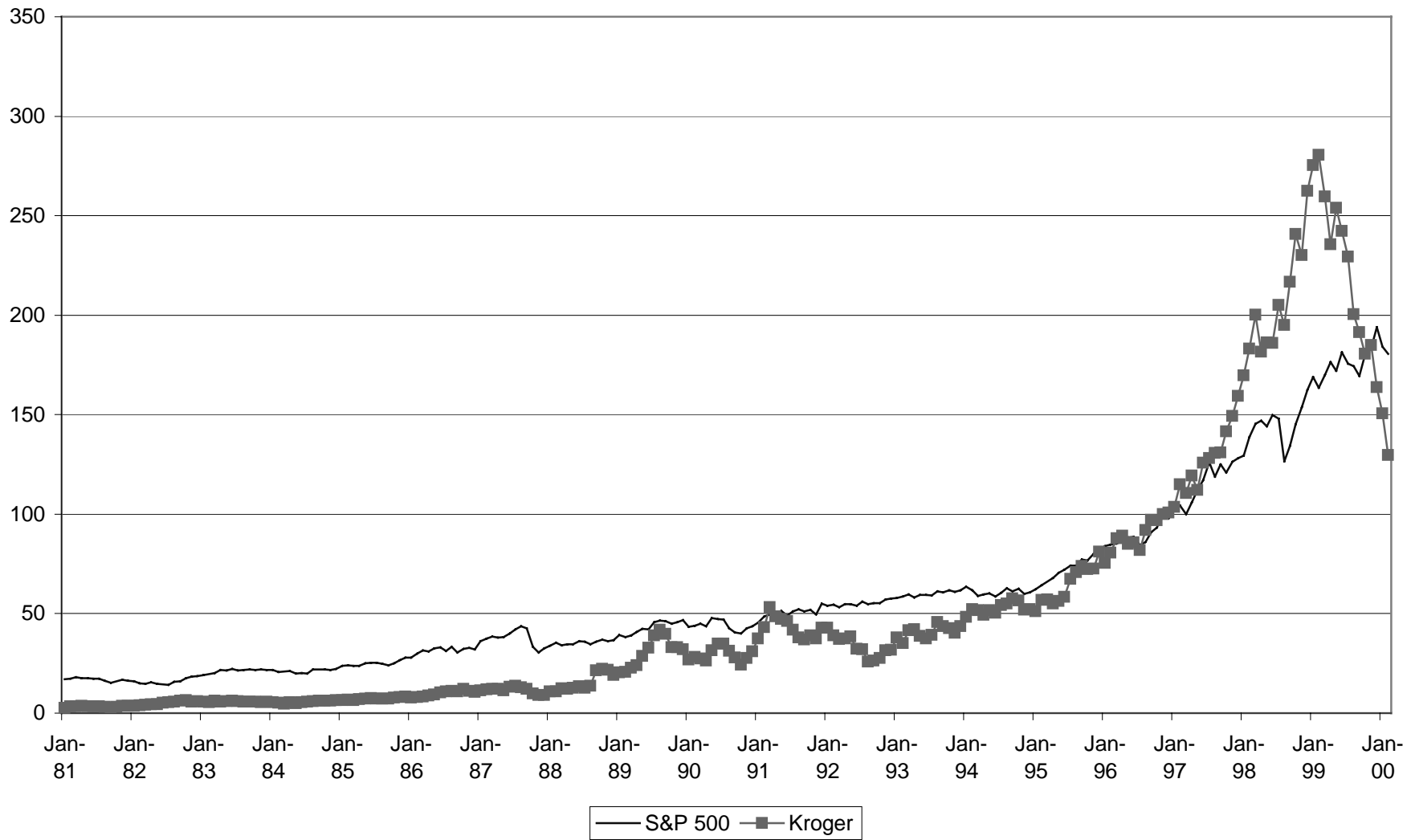
Coke vs. S&P 500 Price Index
November 1996 =100
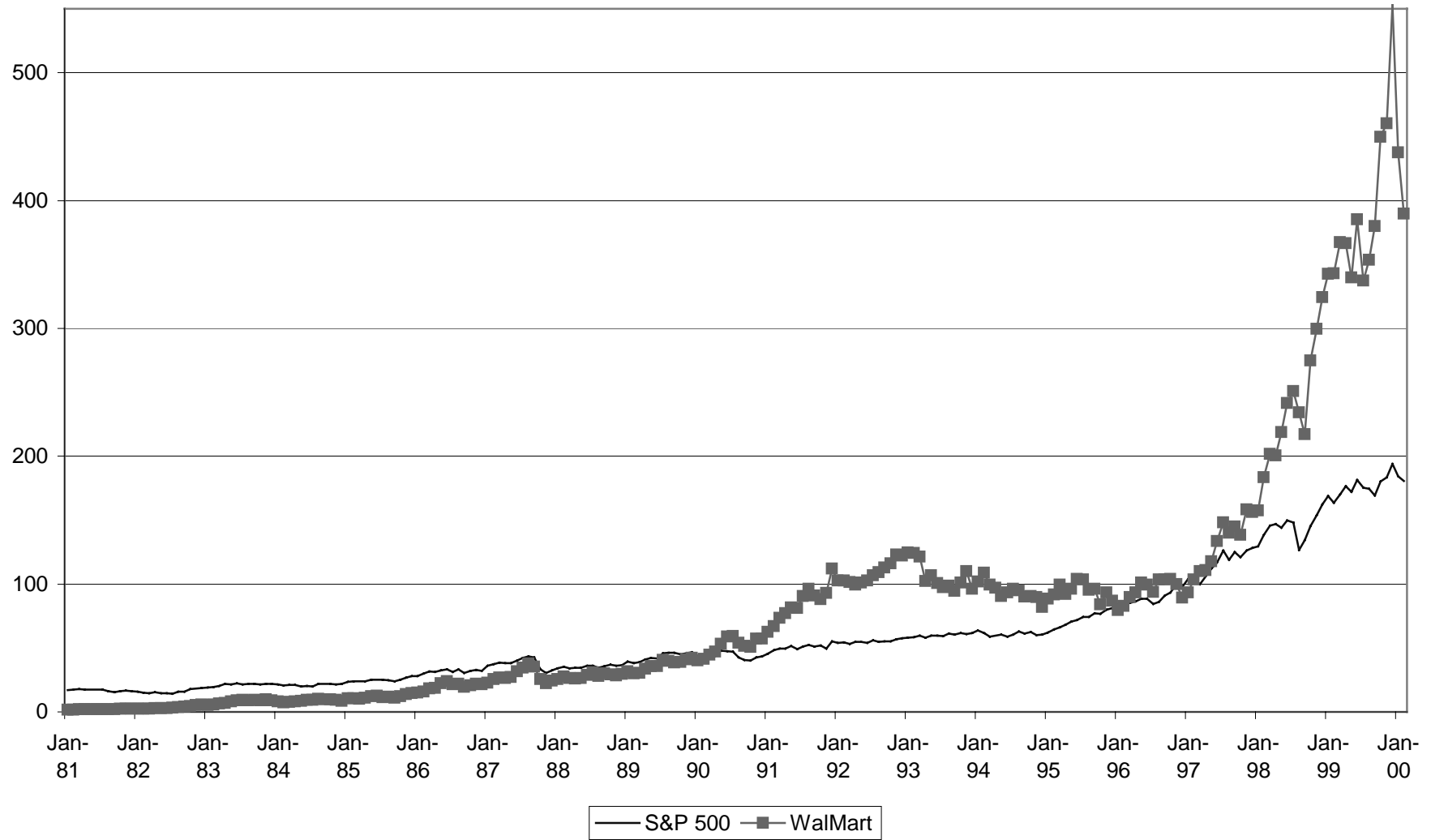
General Mills vs. S&P 500 Price Index
November 1996 = 100

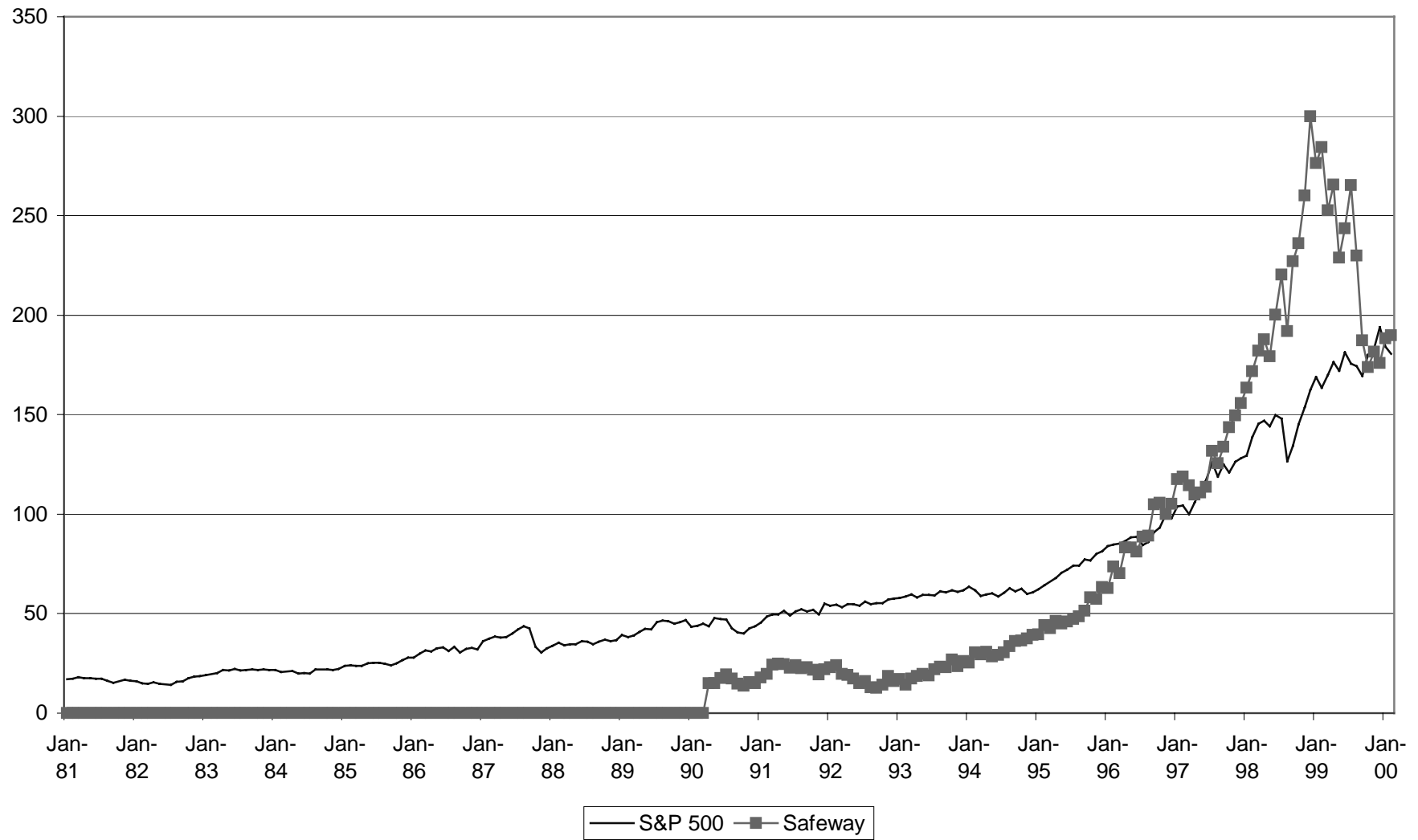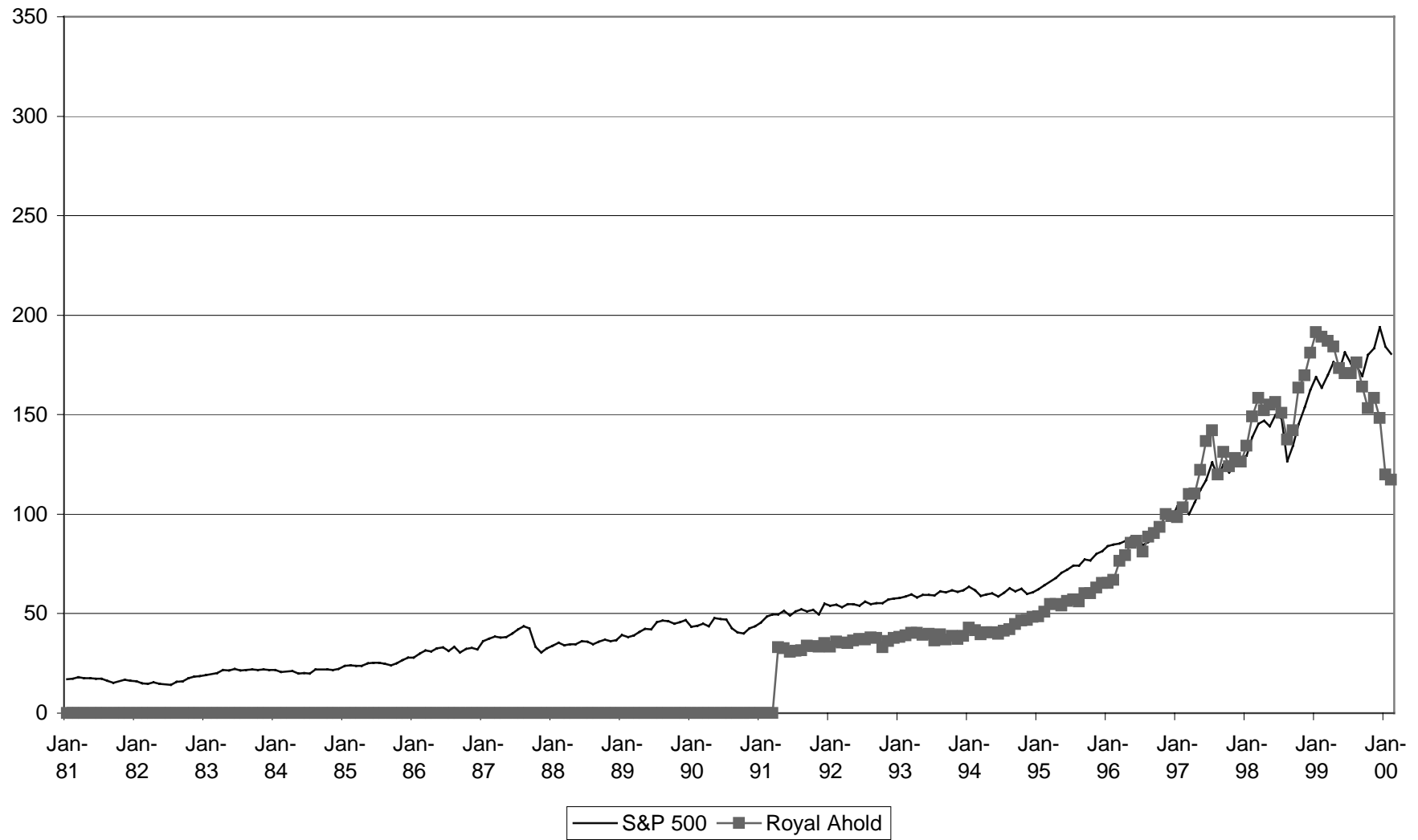# Kellogg vs. S&P 500 Price Index
November 1996 = 100

S&P 500 ▪ Kellogg

Kroger vs S&P 500 Price Index
November 1996 = 100

Legend: S&P 500 — Kroger

Walmart vs. S&P 500 Price Index
November 1996 = 100

Legend: —— S&P 500   —■— WalMart

X-axis: Jan-81, Jan-82, Jan-83, Jan-84, Jan-85, Jan-86, Jan-87, Jan-88, Jan-89, Jan-90, Jan-91, Jan-92, Jan-93, Jan-94, Jan-95, Jan-96, Jan-97, Jan-98, Jan-99, Jan-00

Y-axis: 0, 100, 200, 300, 400, 500

Safeway vs. S&P 500 Price Index
November 1996 = 100

Legend: S&P 500 — Safeway

Royal Ahold vs. S&P 500 Price Index
November 1996 = 100

S&P 500 — Royal Ahold

e commerce Historical Stock Price

Legend: Webvan, PeaPod, Streamline.com, Homegrocer.com